The New Scholasticism

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by Raymond J. Nogar

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A DARWIN SYMPOSIUM *

The Darwin Centennial: A Philosophical Intrusion

by Raymond J. Nogar, O.P.

I. Darwin's Question

I may be permitted to say . . . that I had two distinct objects in view [in writing *The Origin of Species*]: firstly, to show that species had not been separately created, and secondly, that natural selection had been the chief agent of change . . .; hence if I have erred in giving to natural selection great power, which I am very far from admitting, or in having exaggerated its power, which is in itself probable, I have at least, as I hope, done good service in aiding to overthrow the dogma of separate creations. (C. Darwin, *The Descent of Man*, 1871)

IT IS COMMONLY asserted in biological literature that *The Origin of Species* did two things: it scientifically established beyond question of doubt the historical *fact* of organic evolution, and it established a reasonably sound *mechanism* by which the historical fact was accomplished, namely, natural selection.[1] A point which passes unnoticed, however, is that Darwin himself was not scientifically convinced *how far* his proof for the fact of evolution could be validly extended. Here is his own deliberation on this most important question:

It may be asked how far I extend the doctrine of the modification of species. The question is difficult to answer, because the more distinct

* Editor's Note: The three articles published in this issue were prepared and submitted independently of each other. However, they were found to sufficiently interrelated to form another of the Darwin symposia in this centennial year of the publication of *The Origin of Species*.

[1] J. Huxley, *Evolution, The Modern Synthesis* (New York, 1943) p. 13.

the forms are which we consider, by so much the arguments for community of descent become fewer in number and less in force. But the arguments of the greatest weight extend very far. All the members of whole classes are connected together by a chain of affinities, and all can be classed on the same principle, in groups subordinate to groups. . . . Therefore I cannot doubt that the theory of descent with modification embraces all the members of the same great class or kingdom. I believe that animals are descended from at most only four or five progenitors, and plants from an equal or lesser number.[2]

Darwin admits here that as one goes up the taxonomic scale the increasing uniqueness of forms scientifically limits the argument that similarity (homology) signifies common origin. On a certain level, the organic forms may not be related or comparable, morphologically or phylogenetically. But he hastens to add another principle:

Analogy would lead me one step further, namely, to the belief that all animals and plants are descended from some one prototype. But analogy may be a deceitful guide. Nevertheless all living things have much in common. . . . Therefore on the principle of natural selection with divergence of character, it does not seem incredible that, from some such low and intermediate form, both animals and plants may have been developed; and, if we admit this, we must likewise admit that all the organic beings which have ever lived on this earth may be descended from some one primordial form. ***But this inference is chiefly grounded on analogy, and it is immaterial whether or not it be accepted.***[3] (Italics mine.)

Darwin clearly recognized that proof of the *fact* of organic evolution necessarily included the question of the *extent of the fact*. For Linnaeus himself, the author of the famous dictum of immutability which Darwin opposed, admitted in his latter years that perhaps it was the genera which were constant and the species evolved.[4] Using this principle, Linnaeus would not

[2] C. Darwin, *The Origin of Species* (6th London Edition) ch. 15, p. 469.
[3] *Ibid.*
[4] Linnaeus applied his axiom of immutability, " We count as many species

have found Darwin's argument that the species of finches on the Galapagos Islands descended from the South American Genera totally unacceptable. But how far up the taxonomic ladder does the argument apply? Were the Genera immutable? Or were the Genera mutable and the Families immutable? Or did mutability extend to the Orders, to the Classes, to the Phyla? Or did the fact of evolution extend all the way to the beginnings of life itself?

Darwin frankly did not know how far his proof extended and to what extent organic evolution took place. It was a difficult question. He would extend it as far as the biologist was able to observe similarities in closely allied forms. As he ascended the taxonomic scale, it became increasingly difficult to determine whether he had this singular morphological relation. He had an opinion about this extension and no more. He thought he could validly carry it to about ten primitive forms. To extend evolution further demanded, by his own admission, a new principle, *analogy*.[5] Forms unrelated by homologies, yet having remote resemblances, could conceivably be related. Assuming phyletic descent by natural selection, it is not incredible that they, too, be descended from a common progenitor. But this inference is not scientifically grounded in Darwin's *Origin*, and it is immaterial to his argument if you accept it or not.

Hence, when it is said that the *Origin* proved the fact of organic evolution, it must be remembered that whatever proof is found here *applies only to closely allied* (*homologous*) *morphological forms*, and the extent of the proof rests entirely upon the assumption that morphological forms can be compared,

as have been created from the beginning," to the genera rather than species in later editions of his *Systema Naturae*. Cf. E. Nordenskiold, *The History of Biology* (New York, 1935) pp. 210-14.

[5] Biological homologies and analogies are contrasted in E. Dodson's *Evolution* (Philadelphia, 1952) pp. 49-52.

that is to say, that there are morphologically related forms. Darwin agreed that not *all* organic forms can be compared, but the rules for judging closely allied forms were not explicit. This is reminiscent of the famous Cuvier-St. Hilaire debates (1830) in which this issue of related vs. unrelated forms was discussed.[6] Traditional morphology, rooted in the anatomy, physiology, classification and natural history of Aristotle, made a careful distinction between similarities which manifested related forms and likenesses which were only analogous. The extent of the fact of evolution, in Darwin's mind, hinged upon this old issue, and in the *Origin*, he only hinted at a solution. Later, Haeckel's unsuccessful attempt to obliterate this distinction and make homologous and analogous resemblance equal signs of relationship showed the tenacity of traditional morphology in the face of the phylogenetic assumption.[7]

Darwin and Monophyletic Evolution

When we read that Darwin proved the fact of evolution, we understand this to mean first that he copiously documented the evidence for a highly limited descent with modification proposed and recognized by biologists before him.[8] More importantly, however, he *extended* the concept of descent with modification to the higher levels of the organic hierarchy, to the Genera, the Family and the Class. His main thesis was not simply to prove that some kind of organic change had and was taking place, but that organic change was taking place on a grand

[6] Cf. Nordenskiold, *op. cit.*, pp. 341-43.

[7] Cf. E. Radl, *The History of Biological Theories* (London, 1930) pp. 129-143. See also Nordenskiold, *op. cit.*, pp. 518-19.

[8] Not only had various *theories* of evolution been proposed before Darwin, but evidence from every department of biological research which Darwin used had been adduced for the *fact* of some kind of evolution by biologists prior to Darwin. Consult Nordenskiold; C. Singer, *The Story of Living Things* (New York, 1931); also Radl, *op. cit.*, and *Forerunners of Darwin 1745-1859*, edited by B. Glass, O. Temkin and W. Strauss (Baltimore, 1959).

scale, on the higher levels of taxonomy. It was by what he thought a reasonable extrapolation that *he elaborated an essentially monophyletic theory of evolution.*[9] His researches, his thought, his theory were monophyletic, that is, moving in the direction of making the origin of all living forms reside in a single progenitor. The importance of his work, then, was not merely to show the fact of evolution, but to show the extension of the fact. How had he been able to do this?

Darwin extended the fact of organic evolution by the use of two diverse principles: one biological and the other purely dialectical. *The first principle was the application of the axiom: morphological affinity signifies common descent.*[10] In order to facilitate the extension, he emptied the concept of morphological type as much as he could by declaring Species to be an arbitrary designation of discontinuity in nature.[11] The whole concept of morphological type became less sharply defined, and differences among organisms became more and more accidental. Consequently, he was able to develop a doctrine of independent characters which asserted, in effect, that aspects of the morphology could, by natural selection, develop independently of the compensation of the whole. This position made it possible for him to extend his application of the similarity axiom, for then it was not a case of looking for affinity of whole forms; affinity of parts was sufficient. The search for homologies began to reveal similarities among parts which traditional morphologists would not accept as homologies at all, for to them truly related forms must be judged so, not in terms of independent parts but only in terms of the whole organism. It was obviously a question of how to determine which forms in nature are related and which forms are

[9] ***Monophyletic evolution***: descent with modification from a single organic lineage as contrasted with ***Polyphyletic evolution***: descent with modification from many distinct lineages.

[10] C. Darwin, *The Origin of Species*, ch. 14, p. 404.

[11] *Ibid.*

unrelated. Darwin recognized this question. He saw the limitations of the axiom of similarity in theory, but he worked very hard in his application of the axiom to extend the concept of homology just as far as he could.

Darwin's second principle by which he proposed to extend the fact of evolution was, by his own admission, of an hypothetical order: the assumption of phylogeny by natural selection with divergence of character. If phylogenetic origin by this means is assumed, then there is nothing to hinder the conclusion that all organic beings descended from a single primordial form. This is a universal mechanism, and it could explain other nonhomologous resemblances which relate all forms, at least analogously. The assumption of monophyletic origin by natural selection, however, clearly remains in the hypothetical order, and the use of the hypothesis is not probative, but only suggestive. By using it, one could make the fact of evolution absolutely monophyletic. It cannot be insisted upon too much, for the sake of accuracy, that Darwin, although he felt inclined to make this last inference often, regarded the inference grounded chiefly on analogy, and the biologist could accept it or not.

Apropos of this last principle of extension, Darwin separated his proofs for the fact of evolution and his theory of natural selection in *The Descent of Man*, as we have seen, but it is not so easy to separate them in his one long argument of the *Origin*. They are so interrelated that it is almost impossible at times to detect when the fact is used to manifest the correctness of the theory and when the correctness of the theory is used to manifest the fact of monophyletic evolution. J. Huxley assures us that this is not circular reasoning.[12] Be that as it may, history of biological debate following the publication of the *Origin* enabled the argument for the fact to be detached somewhat from the theory of natural selection.

[12] J. Huxley, *op. cit.*, note on p. 13.

For although Darwin's thesis was closely inspected and hotly contested on every level and detail, his argument for the fact of evolution fared better than his theory of selection.[13] As Darwin had feared, he had exaggerated the power of natural selection, and by the turn of the century, his theory was eclipsed and underwent a long period of agnosticism.[14] This development deserves careful analysis because of the rise of "neo-Darwinism"[15] in the second quarter of this century; however, it lies outside the scope of our present purpose. Throughout this period of decline, conviction that the fact of evolution had been proved remained unshaken. On this point, the assurance came from a rather unexpected quarter, the area of biological research which caused Darwin the most trouble: paleontology.[16] T. Huxley wrote in 1907:

> Primary and direct evidence in favour of evolution can be furnished only by paleontology. . . . If evolution has taken place, there will be its mark left. If evolution has not taken place, there will lie its refutation.[17]

W. Bateson reported the same conviction before the Asso-

[13] Cf. Radl, *op. cit.*

[14] Cf. Nordenskiold, *op. cit.*, p. 476; Radl, *op. cit.*, ch. 33; Dodson, *op. cit.*, pp. 94-97.

[15] The name *neo-Darwinism*, used throughout this paper, is ambiguous. This resurgence of Darwin's theory of natural selection confronted by the facts of genetics led to a restatement of the theory based upon a variety of sources, some of which were non-Darwinian or even anti-Darwinian. The new theory, although quite different from Darwin's, retains fundamental affinities, and the early proponents called themselves "neo-Darwinists." More recently, however, accentuating the remarkable differences, the many members of this oustanding group prefer, for accuracy sake, the name *Modern Synthetic Theory*. Cf. George G. Simpson, *The Meaning of Evolution* (New Haven, 1949) p. 277.

[16] *The Origin of Species*, chs. VII and X. For an interesting contemporary discussion of this problem, see A. S. Romer, "Darwin and the Fossil Record" in *A Century of Darwin*, edited by S. A. Barnett (Cambridge, 1958) pp. 130-52.

[17] Address on "The Coming of Age of *The Origin of Species*," in *Darwiniana* (Macmillan, London, 1907) p. 239.

ciation for the Advancement of Science in 1921: belief in the fact of evolution rests upon the paleontological record.[18] But this victory must be attributed to Darwin, for, as we shall see, proof for monophyletic evolution from the fossil record depends upon the application of the two principles he set down in the *Origin*: the use of his canon of similarity, and the use of his assumption of phylogeny.

The Evidence of the Fossil Record

Darwinism was dead, perhaps, but no one could gainsay the paleontological record. But what did the record say? It seemed to show *two significant trends*, both of which Darwin himself had recognized. The first inference from the fossil record was the marked progression of appearance of major groups of flora and fauna. This became the *principle of morphological succession or continuity.* The fossil record showed that there was a time when there was no life. Then, in carefully documented succession, the major groups of organisms appeared; all the phyla except the vertebrates, then the vertebrates, the fishes first, then the wingless insects, the amphibians, the reptiles, modern insects, modern birds, the mammals; then, among the mammals and late, the anthropoids, and very recently, man. This record of successive appearance (and extinction) also seems to show a progression from less specialised to more specialised forms.[19] Some progressive succession, therefore, seems to be evident from the general record, showing the order of Phyla and Classes. But is this succession apparent in a more detailed analysis of the record on the level of the Family, the Genus and Species?

By 1800, the main lines of the fossil phylogeny of Equidae (the Horse Family) had been documented. From the small

[18] E. Dodson, *op. cit.*, pp. 96-97.

[19] *Ibid.*, pp. 72-73. For a complete survey, cf. W. K. Gregory, ***Evolution Emerging*** (New York, 1951) vols. 1 and 2.

primitive browser Hyracotherium (eohippus) of the Eocene epoch, 60 million years of horse history were constructed. Marked gradual change in size, agility, morphology (e. g. toes, teeth) and feeding habits were inferred from the record, and, to the satisfaction of most paleontologists, a fairly continuous succession of genera and species within the Horse Family was established.[20] Today, similar fossil histories within other Families (e. g. Camel, ammonites, etc.) seem to support this continuity principle.

The evidence for succession and continuity of fossil forms thus far described is gathered from variously separated ecological niches. What does a more detailed investigation of the *same* geological stratum show? Probably the most perfect series of successive progression is the elaboration of five species of sea urchins (the echinoid Micraster) found buried in the English Chalk; thus showing, again to the satisfaction of most paleontologists, the apparent successive descent with modification within a genus. There are other less satisfactory records within a single stratum, and from these researches, the principle of succession and continuity seems to be established.[21]

But the fossil record seems to show a second significant trend, which can be called a witness to the *principle of morphological discontinuity*. What was equally obvious to Darwin, and is to us today, was discontinuity—conspicuous morphological breaks and gaps in the fossil record. At the first appearance of life, the record showed a sudden proliferation of all the Phyla except the Chordata, without previous transitional forms ushering them in. As the various Classes of vertebrates appeared on the paleontological scene, they seemed to arrive in sudden bursts of many Families, Genera and Species without transitional

[20] G. G. Simpson, *Horses* (New York, 1951).

[21] D. M. S. Watson, "The Evidence Afforded by Fossil Vertebrates on the Nature of Evolution," in the Symposium *Genetics, Paleontology and Evolution*, edited by Jepson, Mayr and Simpson (Princeton, 1949) pp. 46-48.

forms. For example, even in the record today, the Birds seem to follow the Reptiles without any transition between the bird form and the reptile form. Within the Orders, and to some, within the Families, this same discontinuity seems to be manifest, and so evidently does it seem to be of the essential motif of the fossil record, that the principle of discontinuity can be said to have equal status to the above principle of succession. Darwin thought the explanation for discontinuity was to be found in the incompleteness of the record, but subsequent research, although filling in some detail with linking forms, confirms rather than destroys the principle of morphological discontinuity.[22]

From the fossil record, then, what can be inferred? Insofar as fossils can reveal to us the history of the biological past, paleontologists agree that evolution must have taken place on the level of species within Genera. For how else can you explain the record of Micraster? Paleontology seems to be a witness to the fact of evolution on this level. But how far can you extend the fact? Does the fossil record manifest a monophyletic evolution? As Darwin said in the *Origin*: "the question is difficult to answer." It is the same question that Darwin had to answer, and the principles he used are the very same ones which the paleontologist uses to answer the question, namely, the *axiom of similarity* and the *assumption of phylogeny* by some methed of descent with modification.

As an illustration, let us look again at the fossil record. Does not the documented history of the Horse prove the fact of evolution within the Family? Does not the principle of continuity and succession of fossil forms of the Horse demand this inference? It is a question of how far one is willing to extend the axiom of similarity and assume phylogeny. E. Case warns us:

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[22] T. G. Dobzhansky, *Genetics and the Origin of the Species*, 2nd edition (New York, 1941) p. 343.

It must be constantly kept in mind that the fossil record is a matter of discrete occurrences which have in many instances been grouped together by interpretation of structure and by sequences in time; both, in most cases, forming a chain (phylogenies) with many weak links supported by assumptions and abstractions. This is a weakness only too often overlooked. Even the most perfect phylogenetic series, as of the horse, elephant, camel, and ammonites, are subject to question.[23]

These "assumptions and abstractions" which draw together apparent discontinuities in the record are nothing other than the criteria that similar forms are not only morphologically but genealogically related, and/or the assumption of phylogeny by selection or some other mechanism. The discontinuities of the fossil record, especially on the higher levels of taxonomic division, demand the extension of the two principles as far as possible. Unless the principle of similarity, which has limited application,[24] is supplemented by the assumption of phylogeny, *monophyletic evolution cannot be inferred from the fossil record.* Even if the assumption of phylogeny is used to extend the fact of evolution to a single progenitor, the inference remains, as in the day of Darwin's *Origin*, "chiefly grounded on analogy and it is immaterial whether or not it be accepted."

Because the analysis of the paleontological record depends upon the methods of comparative anatomy and traditional morphology, the scientific restrictions placed upon the argument for genealogical relationship from homologies are great. That is, where there is evidence that the forms are not necessarily related morphologically, the supposition of genetic relationship is weak. For the traditional morphologist, the assumption of phylogeny, unfounded upon true homology (only analogy), is tenuous, and, at best, is a secondary principle in the interpre-

[23] E. C. Case, "The Dilemma of the Paleontologist," in *Contributions From the Museum of Paleontology*, vol. IX, no. 5 (University of Michigan, 1951) p. 180.

[24] D. W. Thompson, *On Growth and Form* (Cambridge, 1948) pp. 1019-25; cf. Case, *op. cit.*, pp. 175-80; Nordenskiold, *op. cit.*, p. 519.

tation of the record. To him, the principle of discontinuity will be patent, and he will be more critical of any asserted continuity in the record. On the other hand, there is the paleontologist who, seeing the limitations of the canon of similarity, and the possibilities of the assumption of phylogeny, will tend to interpret the record with greater emphasis upon the principle of continuity. Assuming phylogeny, he will see fewer gaps, for these discontinuities will be bridged by the assumption.

Consequently, contemporary paleontology is divided into two representative groups: those who interpret the record with emphasis upon Darwin's first principle of morphological homology (for him probative) and those who place the emphasis upon Darwin's second principle of phylogenetic analogy (for him hypothetical). The upshot is that the fact of evolution is proved by the paleontological record only to the extent that morphological similarities prove common descent (which is debated among biologists today) and to the extent that phylogeny by natural selection, mutation-selection or the modern synthesis can be shown to be demonstrated (which is debated among biologists today). *If the fact of a limited evolution is proved by the fossil record, how far the fact of evolution extends up the taxonomic ladder seems no nearer resolution today than it was in Darwin's Origin.*

Indeed, there remains that small contingent of biologists, too conservative to be popular, which defends the position that the only scientific conclusion which can be drawn from the fossil record, or any other biological discipline, is a limited polyphyletic evolution extending to and including the natural Family. That there is strong evidence for organic evolution above the Family (among Orders, Classes, Phyla, Kingdoms) is denied by these biologists who assert that to extend the fact of evolution beyond the natural Family is to assume what has to be proved—that phylogeny is monophyletic.[25]

[25] E. g. L. Vialleton, L. Cuénot, P. Lemoine, L. Berg, E. Guyénot, M. Caul-

II. Darwin's Question Today

Evolutionists of the nineteenth century were interested primarily in demonstrating that evolution has actually taken place. They succeeded eminently well. Evolution as a historical process is established as thoroughly and completely as science can establish facts of the past witnessed by no human eyes. At present, an informed and reasonable person can hardly doubt the validity of the evolution theory, in the sense that evolution has occurred. (T. Dobzhansky, *Genetics and the Origin of Species*, 1951)

In the light of Dobzhansky's statement above, and this position is axiomatic in contemporary biology, the conclusion of the first section of this article may seem purely contentious and gratuitous. For when he says that the fact of evolution has been demonstrated, he means, of course, monophyletic evolution. Contemporary biology does not discuss the fact of evolution: current problems are centered upon the mode and tempo of evolution. But when we examine carefully the discussions of the paleontologists about the *manner* in which evolution took place, and the *mechanism* by which evolution was accomplished, we notice remarkable divergences as to what the fossil record reveals. *And in this divergence, we find Darwin's old and difficult question—unanswered.*

To illustrate this point, let us consider the controversy about the mode of evolution between two eminent paleontologists, G. G. Simpson and O. H. Schindewolf. Both scientists agree upon monophyletic evolution. Both men accept the fossil record as it stands; yet they differ profoundly in their interpretations. The point of difference operates on many levels. What are the trends of evolution, orthogenic or non-orthogenic? What is the tempo of evolution, constant or variable? How is evolution

lery, R. Carpentier, etc. This theory of a moderate form of polyphyletic evolution is treated in detail by G. H. Duggan, S. M., *Evolution and Philosophy* (New Zealand, 1949); cf. also D. Murray, *Species Revalued* (London, 1955).

accomplished, by orthodox mutations or by novel mutations? And so on. Since the solution of all these questions rests upon what the fossil record shows, the point of difference between Simpson and Schindewolf lies in how they look upon the record. Simpson admits the problem:

> A really complete evolutionary lineage is never preserved; . . . The actual data, then, normally consist of relatively small samples of the lineage, scattered more or less at random in space and time. The process of interpretation consists of connecting these samples in a way necessarily more or less subjective, and students may use the same data to "prove" diametrically opposed theories.[26]

Simpson's formulation of his theory of the mode and tempo of evolution can be found in his many books and articles available to the English reader. Schindewolf's position, since it is a minority view,[27] is not readily available to the English public. His writings have not been translated, and Simpson's account (and that of other neo-Darwinists) of his opponent's views is, unfortunately, lacking in detail. But we are indebted for a detailed analysis of the views of these two paleontologists to Dr. Marjorie Grene in *The British Journal for the Philosophy of Science* (1958).[28] Her analysis clearly exposes the essential divergence of their thought concerning the same set of factual data, and it will be illuminating to summarize here the broad outlines of that divergence.

Simpson and Schindewolf disagree on three levels of divergence: on the verbal plane; on the visual plane; and on the

[26] *The Meaning of Evolution*, p. 137.

[27] With minor variations, this view is shared by R. Goldschmidt, *The Material Basis of Evolution* (Yale, 1940) and by C. H. Waddington, "Evolution of Developmental Systems," *Nature* (1941) 147, pp. 108-10.

[28] I am deeply indebted to M. Grene for this analysis entitled: "Two Evolutionary Theories," in *The British Journal for the Philosophy of Science*, XI, August and November, 1958. In her excellent article she drew chiefly upon Simpson's *Major Features of Evolution* (1953) and Schindewolf's *Grundfragen der Palaontologie* (1950).

level of outlook, the way they look at the fossil record. The latter plane is basic. The key to their differences seems to be their attitude towards this issue: *which is methodologcally prior, morphology or phylogeny?* [29] All paleontological interpretation must pose these two problems: assuming that morphological similarity points to organic relationship, what can be said about phylogeny; assuming phylogeny (monophyletic life history), what can be said about morphological similarity? Is morphology to be explained in terms of phylogeny, or vice versa? It is Darwin's question concerning the validity and extent of the use of these two principles.

Simpson gives priority to phylogeny over morphology; Schindewolf gives morphology priority over phylogeny. Simpson says that morphological considerations must give way to the demands of phylogeny; Schindewolf says that phylogenetic considerations must give way to the demands of traditional morphology. Grene summarizes:

> Finally, and most neatly characteristic of this type of situation, the two scientists argue in exactly opposite directions, each taking as his premiss the negation of the others' conclusion. Simpson, wedding paleontology to the statistical methods of population genetics, sees a gradual change in populations such that the sharp divisions of traditional morphology become false. Schindewolf, basing his theory on the logical priority of morphology, concludes that the gradualist, statistical picture of neo-Darwinism is false. To put it very schematically; Simpson argues: the neo-Darwinian theory is true; morphology implies that neo-Darwinism is not true; therefore morphology is wrong. Schindewolf argues: morphology must first be accepted as true; morphology implies that the neo-Darwinian theory is wrong; therefore the neo-Darwinian theory is mistaken. Or to put the matter another way, they agree on their major premiss: *traditional morphology and neo-Darwinism are incompatible.* One says: Darwinism; therefore not morphology; the other says: morphology, therefore not Darwinism.[30]

Simpson sees the record as a continuous adaptive life stream

[29] *Ibid.*, p. 116. [30] *Ibid.*

and fossil morphology is "interpreted" in that light; Schindewolf sees the record as a discontinuous document, full of morphological gaps, and "interprets" the life stream (phylogeny) in that light. To Schindewolf, even where there can be no serious question of inadequate fossil evidence, new structures with entirely new types of organization turn up unheralded by transitional forms. To Simpson, these are not new types of organization, but merely divergent phases of the old forms. To Schindewolf, *Archaeopteryx* is a bird, that is an animal that flies by means of feathers. It is the first bird recorded. There have been many since, but the transition from the Class Reptilia to the Class Aves happened then and there. The morphological (and physiological) principle, flight by means of feathers, was genuinely new. If the bird came from the reptile, a bird was hatched from a reptile's egg. To Simpson, on the other hand, *Archaeopteryx* was just another reptilian species, the last of the reptiles in one direction of development if you will, arising by normal speciation from other reptilian species. Where Schindewolf sees discontinuity, Simpson sees continuity.[31]

Basic, too, is the divergence in their outlook on the concept "species." Simpson, following Darwin, makes species as arbitrary as he can. He eliminates, as far as possible, the concept of *type*. Phylogeny reduces the type of traditional morphology to a minimum with Simpson, and his species are statistical zones of adaptability which, with their "peaks" and "valleys," shade imperceptably into one another. For Schindewolf, morphological type remains central. The sudden appearance of a new type (typogenesis), its orthogenic advance (typostasis) and the breaking up of types and their extinction (typolysis) are phases of his theory of the mode of evolution, the whole of which is called typostrophism. The process of development

[31] *Ibid.*, p. 114.

(phylogeny) is understood only in terms of discontinuous morphological types of species.[32]

One other parallelism of the two theories can be noted. Simpson sees evolution of all organisms as a continuous series of minute changes in innumerable directions, in which all alterations of any significance, larger as well as smaller, quicker, as well as slower, are determined by the great co-operating "pressures" of micro-mutation, geographical isolation, and selection, with adaptation as the universal effect and criterion of systematic change. Schindewolf, on the other hand, denying that such micro-mutations and adaptation can explain the morphological discontinuity of the fossil record, makes the assumption that *life can originate novelty.* If phylogeny is a fact to be explained, and he is a monophyletic evolutionist, morphological discontinuity demands a novel kind of mutation unknown to present genetic research. He does not explain the concept, he just maintains that the record demands it.[33]

Some Methodological Canons

What becomes only too clear from this brief account of a few key differences in these two eminent paleontologists' views of what the fossil record means is that biological methodology, the scientific approach to the record, determines not only the theory of evolution, but also any inference concerning the extent of the fact of evolution. As was evident in Darwin's *Origin*, and is evident in the Simpson-Schindewolf controversy, the extent of the fact and the explanation of the mode (theory) by which the fact occurred are not easily separated. In both cases, it is a question of the relevance and order of the two principles Darwin set down: morphological similarity and the assumption of phylogeny. It is not, fundamentally, a question of tech-

[32] *Ibid.*, p. 112.

[33] *Ibid.*, p. 115. This novel mutation Goldschmidt calls "systematic mutation."

nique of investigation. It is plainly a question of biological methodology. As Aristotle had remarked in the opening of his biological treatise *On the Parts of Animals:*

> Hence it is clear that in the investigation of nature, or natural science, as in every other, there must first of all be certain defined rules by which the acceptability of the method of exposition may be tested, apart from whether the statements made represent the truth or not.[34]

In resolving the differences between Simpson and Schindewolf, as in resolving the question raised by Darwin concerning the extent of organic evolution, the impartial observer must be able to judge whose exposition is proceeding in a way most likely to arrive at the truth. Unless he commits himself arbitrarily to a "climate of opinion," he needs rules by which he can judge the value of the two positions. The following are a proposed selection of methodological canons without which, it seems to me, the matter cannot be resolved.

Canon 1. *The exposition of the biologist must proceed from the better known to the less known, not vice versa.* Grene expresses this canon when she asserts that there is no such thing as total objectivity in historical statements; we can only look back and evaluate the evidence from where we are.[35]

Canon 2. *The exposition of the biologist must proceed with neither more concepts, nor fewer concepts than are necessary to account for the organic reality or process.* This is one formulation of the economy principle called Ockham's razor which, again agreeing with Grene, cuts both ways.[36] An explanation is better if simpler, but of no avail if it is over simplified, for it must give sufficient reason for the facts or the inference.[37]

[34] Aristotle, *Parts of Animals*, I, 1, 639a10-15.

[35] Grene, *op. cit.*, p. 187.

[36] *Ibid.*, p. 190.

[37] The axiom usually attributed to Ockham (1335): "A plurality must not be asserted without necessity" (*Quodlibeta Septem*, V, 5) was formulated and used in earlier scientific treatises. Thomas Aquinas (1260), for

CANON 3. *As an organism as a whole appears and acts, so it must be considered to be.* Biological organisms reveal themselves as data of scientific experience through their appearance (morphology) and their function and activity (physiology and ecology). We must have concepts in our biological exposition which enable us to account for this appearance and activity.

CANON 4. *Besides matter and motion (physical and chemical), some concept of type or form is necessary.* This canon is evident from the fact that if we go from the more known to the less known, and give a sufficient reason for the appearance and activity of the organism, we must use some concept of form or total organization.[38]

CANON 5. *Homogeneous forms can be related by comparison; heterogeneous forms cannot be related by comparison.* The axiom: "heterogenea comparari non possunt" is as valid in biology as it is in logic; Aristotle [39] and Darwin [40] and traditional morphology recognize the limits of comparison of type or form.[41]

CANON 6. *The exposition of the biologist must first account for the organism as it actually is in its completed state, and then account for the processes according to which it was formed.* We know the organism better in its actual appearance and activity than in its genesis and development. We know the organism better in its ecology, physiology and morphology than in its phylogeny, its genetics and its embryology. Neo-biology is better known than paleo-biology.[42]

CANON 7. *Processes of development in organisms, whether*

example, expressed it thus: "Quod potest fieri sufficienter per unum, superfluum est si per multa fiat." *Sum. contra Gent.*, III, 70.

[38] Grene, *op. cit.*, p. 191; Aristotle, *Parts of Animals*, I, 1, 640a10-35.

[39] Aristotle, *Historia Animalium*, I, 1, 486a-487a.

[40] *The Origin of Species*, p. 469.

[41] D. W. Thompson, *op. cit.*, p. 1034.

[42] Cf. Aristotle, *Parts of Animals*, I, 1, 640a10-35.

of the individual or of the species, must be presumed to be substantially the same for paleo-biology and neo-biology. This canon is the corollary for canon one. It is the celebrated principle by which C. Lyell destroyed former catastrophic theory in geology and upon which he founded modern scientific geology and paleontology.[43]

Simpson or Schindewolf

There are other biological canons which must be formulated to resolve other problems, but these seem to be sufficient to resolve the problem before us. Of the two expositions, which paleontologist, Simpson or Schindewolf, is proceeding in a way most calculated to arrive at the best, most coherent reading of the fossil record? We have seen that fundamental to Simpson's exposition is the methodological priority of phylogeny, that is, process of organic formation and life history. Insofar as phylogeny runs counter to traditional morphology, the type concept must go. Material continuity of organic beings and their gradual development is the first principle. Any idea of form or type must be judged in this light, and since it is contrary to his phylogenetic concept, morphological considerations must be reduced to a minimum or abandoned. Schindewolf, as we have seen, begins with actual living forms in their finished state, represented by morphology, and stresses the type; making it methodologically prior in his exposition of phylogeny or process of formation.

As to this cardinal point, it seems necessary to conclude that Schindewolf and his followers are in a considerably more secure position methodologically than Simpson and the neo-Darwinists. Simpson's exposition seems to offend several of the above canons. His explanation fails to go from the more known to the less known; he fails to give a sufficient reason for organic develop-

[43] Nordenskiold, *op. cit.*, p. 456.

ment in that he oversimplifies the concepts necessary to explain the problem, denies type or form, and attempts to discuss the process of formation before he discusses the organisms as they actually exist in the completed state. Schindewolf, on the other hand, methodologically begins with the better known, the actual animal before him in its structure and function. He admits the principle of organization, the type or form, and places it in the prior position in his method of exposition. He discusses, in effect, the animal as we know it in its completed state (represented by morphology) and then the process of formation (phylogeny) in those terms. If we are to apply the above canons to these contrary interpretations of the paleontological data, we would have to admit that Schindewolf is proceeding in a way more likely to give us an acceptable interpretation of the fossil record.

But what about the two theories of the mode of evolution? Simpson maintains that evolution must have taken place in the past by slight, gradual inherited modifications. Nothing new is passed along in the descent; simple minor variations inherent in the genes (gene pool of the ecological populations) are inherited, and consequently there is no creative force involved. He insists that we know only the genetic process of formation now available to genetic experimental method, and that this process is not only sufficient to explain the facts, it is the only process of development known to us. Schindewolf, claiming that contemporary genetic research, showing only process of slight gradual modification by micro-mutation and adaptation, is not of the order necessary to explain the discontinuous process of the fossil record. He assumes mutations of an original nature, by which, for example, a reptile could give rise to a bird. Simpson merely rejects this mysterious mutation as scientifically untenable because it is not a known genetic process.

In this issue, good methodology would require that we prefer Simpson's position to Schindewolf's. Going from the more

known to the less known, we must prefer that explanation which is based upon processes we know to be operating presently. The only known process of descent with modification is the process described by Simpson. Simpson, therefore, is here proceeding in a way more calculated to give us an acceptable reading of the fossil record.

A Summing Up: The Dilemma

And so we see that interpretation of the fossil record, whether it concerns the *fact* of evolution or the *mode* of evolution, depends upon the relative value of Darwin's two principles: morphological similarity and assumed phylogeny. In Darwin's proof of the fact, morphology superseded phylogeny, and monophyletic evolution could not be demonstrated from traditional morphology alone. The argument from assumed phylogeny, however, based upon analogy, was weak and unscientific. With morphology as the prior methodological principle *monophyletic evolution had to be assumed.*[44]

As the Schindewolf-Simpson controversy shows, the reading of the fossil record for the mode of evolution again demands the use of Darwin's two principles. And again it becomes evident that traditional morphology, used as the prior methodological principle (Schindewolf), does not provide an adequate answer to the question of mode of monophyletic evolution. Whether it be a question of fact or mode, traditional morphology does not favor monophyletic evolution.

Darwin, faithful to morphology, *assumed* monophyletic evolution; Schindewolf, faithful to morphology, *assumed* monophyletic evolution. Simpson, seeing that traditional morphology was *contrary* to the assumed phylogeny of Darwinian natural

[44] As Goldschmidt expressly admits, *op. cit.*, p. 4. If evolutionary theory is to be the unitary principle for all of biology, it must be monophyletic. In this qualified sense, polyphyletic descent does not meet the needs of an evolutionary theory at all; cf. A. M. Davies, *Evolution and Its Modern Critics* (London, 1937).

selection (and his own), reversed the methodological position of the two principles, placing phylogeny first and morphology last. What was for Darwin the weakest argument for the fact of evolution, became for Simpson the strongest argument for the mode of evolution, namely, assumed phylogeny. And merely repeating that Darwin and the biologists of the 19th Century proved the fact of evolution, making it seem that the assumption of monophyletic evolution is scientifically unquestionable, obscures the fact that Darwin's difficult question has never been answered; how far, without assumptions, can the fact of organic evolution be extended up the taxonomic scale? And with Darwin, we would have to say that the contemporary debate about the mode of evolution only underscores the fact that rigorous biological method still demands verification of the assumption of monophyletic evolution on the only grounds which Darwin would accept as scientific, similarity of closely allied morphological types. It seems fair to conclude, therefore, that until such verification is forthcoming, *any extension of the fact of evolution and any theory as to the mode of evolution which assumes monophyletic origin must remain in the same state Darwin described so well 100 years ago: "an inference chiefly grounded on analogy, and it is immaterial whether or not it be accepted."*

III. A Philosophical Intrusion

If anyone examines the state of affairs outside the Christian fold, he will easily discover the principal trends that not a few learned men are following. Some imprudently and indiscreetly hold that evolution, which has not been fully proved even in the domain of natural sciences, explains the origin of all things, and audaciously support the monistic and pantheistic opinion that the world is in continual evolution. (Pius XII, *Humani Generis*, 1950.)

During the debates about the meaning and validity of Darwinism in the latter part of the last century, some of the most

serious criticisms came from the metaphysicians. But the philosopher's attitude in the face of the contemporary counterpart, neo-Darwinism, has shown that a marked change has taken place in the science-philosophy relationship. As science grew in stature and her authority in matters of interpreting the cosmos to the student of nature became dominant, the role of metaphysics was relegated to a rather distant and silent arbiter; there seemed less and less use for her abstractions. Consequently, there had to be a change in the kind of statement she made about cosmological and biological theories. Keeping her place, she hesitated to intrude upon the scientific scene. She had her function, to keep first principles intact; scientific theories about the world in which we live are the business of science.

Therefore, when the metaphysician speaks about the theory of evolution, he presumes that the task of determining the fact of evolution and the best theory about the mechanism of evolution has been taken care of by the biologist. The usual comment on the matter amounts to saying that when the biologists decide whether *de facto* evolution of organic beings has taken place, and to what extent it has taken place, and have given us the most plausible theory, the philosopher will see if he can explain it in terms of his metaphysical principles. Only this latter task is his business. And the single issue which seems to bring evolutionary theory to loggerheads with traditional metaphysics today is the implicaton that higher organisms can be caused efficiently by lower organisms. In the words of one philosopher, Fr. Norbert Luyten, O. P., this would mean:

> . . . disproportion between cause and effect, and ruin the very principle of causality which maintains precisely that the perfection in the effect can only be understood as derived from the perfection of the cause. This principle is fundamental in philosophy; there can be no question of giving it up.[45]

[45] Fr. Norbert Luyten, O. P., "Philosophical Implications of Evolution," THE NEW SCHOLASTICISM, XXV (1951) 302.

One senses the feeling of intrusion here, as if it were a question of the metaphysician giving every wide margin he could to the biological theory. But the metaphysician today is willing to grant further concessions, for even this issue is not so serious as it might seem at first glance. The biologist is not really talking about the "essences" of the metaphysician; rather his "species" or "natures" are but taxonomic degrees of complexity among organisms. From this, the biologist cannot claim that what he says about the origin of species has technical philosophical value. Those who argue (as did Haeckel and Spencer) to philosophical monism excluding the necessity of a transcendant cause are exceeding the limits of scientific theory. Such interpretation of evolutionary thought, no longer customary, is proposed only by scientists who are not very realistic philosophers.[46]

But if the scientists should prove that the higher essence did arise from the lower, say the body of man from a lower primate, metaphysics has a very coherent explanation. By invoking instrumental causality, special Divine concursus, the possible influence of the angels, the principle of proportionate cause and effect is easily saved. And thus:

> . . . if evolution means a fundamental change in our view of the world, it does not imply any philosophical impossibility so that from the rational standpoint no veto has to be pronounced.[47]

The metaphysician might even indulge in a little speculation about the fact of evolution (if the scientists prove it to be a fact). Perhaps an injustice has been done to the theory of evolution by examining it only for possible errors. Looking at the matter from the standpoint of the *ordo universi*, he sees in evolution an all pervading finality, proof for God's existence, His greatness, His goodness and His power.[48]

[46] Cf. Fr. A. Brisbois, S. J., "Transformism and Philosophy," *Theology and Evolution*, edited by Fr. E. C. Messenger (London, 1949) p. 114.

[47] Luyten, *op. cit.*, p. 309.

[48] *Ibid.*, p. 310.

This approach of the philosopher to current theories of evolution is a bit strange to say the least, for it is evident that he is not talking about any *biological* theory of evolution proposed by Lamarck or the neo-Darwinists or any other monophyletic hypothesis of the progression of organic forms. Setting aside the sanguine belief that no scientists, or certainly no more than a few who are not "very good" philosophers, draw philosophical monism from evolutionary theory—it is strange that the only clash with traditional metaphysics seems to be the possible assertion that the higher form can arise efficiently from the lower form.

What about evolutionary theory which denies the existence of final causality? This denial is fundamental both to Darwinism and neo-Darwnism. In all this, what happens to the metaphysical axiom that the final cause is the cause of all the causes? What about evolutionary theory which denies the principle of intrinsic finality, the formal cause in nature? Both classical and modern Darwinism rest the development of their theory upon a denial of intrinsic finality in nature. What about the distinction between the substantial and the accidental? For Darwinism, no such distinction exists in the organic world. What happens to the principle of proportionate cause and effect when contemporary evolutionary theory asserts that the apparent organization among organic beings, the diversity of species, is caused solely by chance? What about the distinction between potency and act in that evolutionary theory which is committed to particulate inheritance and preformism?

These serious conflicts between metaphysics and evolution have not just recently crept into the fundamental thought of evolutionary theory. This becomes readily apparent when the observer glances at the vigorous, almost violent, reactions on the part of philosophers of the late 1800's. They took issue with the fundamental implications of evolutionary theory. Indeed, they did not even regard them as implications, as if

they could be misguided inferences on the part of a few biologists. They recognized that these issues were part of the very warp and woof of the theory of the origin of species by natural selection.[49]

In our times, the strained relations between the metaphysician and the scientist, the great pains taken not to intrude upon each others' domain, give the impression that the philosopher does not take seriously what the biologist is saying, and the biologist cares less what the metaphysician thinks. When either speaks about the other's concern, he is obviously "out of his field." There is great concern for professional competence, but little true professional respect passes between them.

In the name of professional respect, the philosopher gives the biologist a free hand, having no interest or concern for his theories until they patently and publicly conflict with some metaphysical principle. But when such assertions are made publicly, the ready reply is that the scientist is speaking out of his field, as a philosopher, and (benignly) not a good one. What the philosopher apparently fails to understand is that when the Darwinist asserts openly that chance is the sufficient reason for the organization of the organic world, and denies outright the existence of intrinsic finality among organisms, or that organic agents simply do not act for any purpose or end, he is calmly saying what is intrinsic to his biological theory of the evolution of species. This is not an unwarranted extrapolation, an inferential extension, of Darwinian theory; it is inherent in the very theory itself, and has been all along.

Some philosophers have argued that evolutionary theory is no immediate concern to the metaphysician because the biologist's concepts are taxonomic and "contructural," devoid of ontological significance. Such taxonomic definitions, and theories

[49] E. g. H. Bergson, *Creative Evolution* (London, 1911). Cf. also Radl, *op. cit.*

based upon them, are false if asserted of the real order.[50] There is no space here to discuss the use and evolution of "constructs" in biology, but it must be observed that *in evolutionary theory, the concepts and proofs are intended to have ontological content and significance.* The Darwinian phylogenies and tables of descent signify real descent. They might begin with morphological relationships, but, as Fr. A. Brisbois, S. J. remarks:

> . . . From the genetic point of view, Transformism (organic evolution) goes further: it seeks to show that these relationships are not merely ideal, but real, and it is indeed solely in this sense that we can speak of Transformism. . . . It is easy to see that Transformism, regarded not as a purely ideal construction but as an attempt at an objective explanation of reality, presents the philosopher as well as the theologian with a serious problem.[51]

Biologists themselves seem to be much more realistic when they assert that the Darwinian theory of evolution has ontological value, that the world of living things is as they describe it, simply without purpose, without specific organization, caused by chance. And for them, this is biologically manifested, not philosophically deduced. Not to take the biologist at his word, not to read him closely enough to see that his thought intrinsically intends to portray his ontological view of the nature and development of organisms, and to inveigh against (or propose) a theory of evolution which is quite unlike any the biologist himself proposes is unrealistic on the part of the philosopher. Profound professional disrespect is here generated, and with good reason. But it works the other way around too. The biologist's failure to realize that the full understanding of the ontological value of evolutionary theory involves issues with

[50] Fr. G. P. Klubertanz, S. J., "The Doctrine of St. Thomas and Modern Science," *Sapientia Aquinatis* (Rome, 1955) pp. 99-100.

[51] Brisbois, *op. cit.*, pp. 110, 111; Fr. Luyten also insists on this point, *op. cit.*, p. 293.

which the metaphysican has a professional right to concern himself generates a similar disrespect. Enlightened resolution of this dilemma obviously rests with professional co-operation, and perhaps the first move should come from the philosopher's attention to the concrete problems actually raised by the present-day theories of evolution. As H. Bergson said so many years ago:

> **Philosophers cannot today content themselves with vague generalities, but must follow the scientists in experimental detail and discuss the results with them.[52]**

The Role of Natural Philosophy

But perhaps there is another reason why the metaphysician might be excused for remaining a bit aloof from the problem of organic origin and succession, for feeling somewhat the intruder into the scientific analysis of nature. After all, natural scientific theories about the processes of natural change are not his *immediate* concern. This, among philosophers, is more properly the concern of the philosophy of nature, whose business it is to investigate the principles, the causes and the elements of nature.

If the theory of evolution does not concern itself primarily with " essences " as such, certainly it is concerned with natures, living organisms subject to change, to birth, to life processes and death. Darwinism and natural selection involve matters which lie at the heart of the philosophy of nature. For the theory of natural selection strikes deeply at the formal unity of the organism, effectively denying the intrinsic unity of natures. It denies that living organisms act for an end, asserting that the formation of the organism and its unity can be explained fully by physical and chemical composition and the cosmic agents which act upon them. It denies the existence

[52] Bergson, *op. cit.*, p. 82.

of natural species. It asserts that chance can be and is the sole and sufficient reason for organization and organic process, and that the reason for necessity or determinism in this process is the material composition and the extrinsic agents, not the end. It asserts that the process of formation, the phylogeny, explains the structure and function, the morphology and the physiology. Each of the affirmations or denials of current evolutionary theory touches upon the very nerve of natural philosophy, and therefore, if the metaphysician can be excused and remain aloof, certainly this discipline cannot fear to intrude into the domain of scientific explanation of the world of living organisms—and be true to itself.

On the other hand, the biologist may object that the natural philosopher is not competent to discuss these matters with him. To forestall this objection, one contemporary philosopher, seriously concerned with the evalution of current evolutionary data and theory, recently set down the following four reasons why a philosopher can be competent to deal with the origin of diversity of species in the organic world. Fr. G. H. Duggan, S. M., in his *Evolution and Philosophy* (1949), observes that (a) the problem is primarily one of logic, of determining what can be validly inferred from the available data; because of the philosopher's special training in logic, he is at least as prepared as the biologist in drawing inferences. (b) The philosopher is less likely to be the unconscious victim of philosophical prejudices, for the scientist proceeds in his investigations without too great a concern for philosophical implications—which may enter into his theories more surreptitiously for this reason. (c) Most biologists are experts in a limited field and have no more information regarding related fields on the question of evolution than is available to the philosopher, and their judgments are based as much, if not more, upon the judgments of those in related fields. (d) And finally, for an adequate appreciation of the relevant data, it is not necessary to have an expert

knowledge of biology, much less be trained in the technique of biological research.[53]

There are certainly many important elements of truth in Duggan's analysis, and perhaps the biologist would admit that the philosopher might have a good training in logic, less likely to allow a philosophical implication to pass unnoticed, and is in as good a position to acquire materials and information about the data and the theories of evolution as most research biologists. But one thing might concern the biologist, and this truly in the name of professional competence. The theory of evolution and its evaluation are not merely a matter of general logic, whether conclusions follow from premises, what can validly be inferred from the available data. *It is a matter of a special logic, a biological methodology if you will.* And a corollary to this is that although adequate appreciation of the relevant data does not require expert knowledge of all the factual details or research technique, a mere educated man's reading of *The Origin of Species* or an intelligent reading of some contemporary outline of paleontology is not enough either. *One must have a knowledge of relevant data in that detail which would assure the removal of arbitrary judgment in matters of biological fact.* This knowledge comes not merely from a generally educated man's review of the theory, but more from a naturalist's concern and investigation of the problem in some detail.

The basic problem of evaluating the evidence for the fact of evolution and evaluating which theory of evolution is most satisfactory is, as we saw above, one of applying the canons of biological methodology to sufficient relevant data. For the philosopher, therefore, it is a question, not of general logic, not of metaphysical principle, but of the special methodology of natural philosophy. But even this does not satisfy the requirement of professional competence. It must be the application of the

[53] Duggan, *op. cit.*, p. 89.

special methodology of natural philosophy, not as it applies to the whole of cosmic process, but precisely as it applies to the processes of living organisms. It is not a question of general natural philosophy, but of biological philosophy or theoretical biology, which are the same thing.

Aristotle saw this clearly in his elaboration of rules for discussing similar biological problems.[54] The question of the principles, causes and elements of organic nature and its process of development was raised, not on the level of metaphysics, nor on the level of general logic, nor even on the level of general natural philosophy; it was raised in the only place where the proper principles were elaborated which were sufficient to resolve it, on the level of the history and parts and generation of animals. It was a question of applying biological methodology to relevant biological facts.

Albertus Magnus, applying the unitary theory of Aristotle's natural philosophy, spent his life trying to extend biological method into the specific details of nature by augmenting the rather meager stock of organic data.[55] More recently H. Driesch, to single out one from a great number of scientists, seeing that the abundance of organic data was lacking in adequate method for reliable interpretation, spent the later period of his life trying to cultivate a less arbitrary biological methodology.[56] Albertus Magnus did not become less a natural philosopher for his attention to the specific details of organic nature, but a better one. Driesch did not become less a biologist for his concern for better methodology, but a more competent one. Call them natural philosopher or theoretical biologist, on this level of biological analysis, they are one and the same thing.

[54] *Parts of Animals*, I, 1-5.

[55] B. Alberti, *Opera Omnia*, ed. Borgnet, Paris (Vives, 1890) *De Plantis*; *De Animalibus*; Vols. 10-12.

[56] H. Driesch, *The Science and Philosophy of the Organism*, 2nd edition (London, 1929).

This is a delicate and most crucial point. Biological method does not work in a vacuum; nor does relevant biological data interpret itself. Nor is the former superimposed upon the latter in a mechanical fashion. Professionally competent data and professionally competent analysis and inference are corollaries. Professional competence need not mean the excellence of detailed specialization either in biological or philosophical discipline. *Professional competence means the progressive elimination of the arbitrary from the choice of data and from the inferences drawn from those data.*

Therefore, the natural philosopher must be able to handle the details of organic data essential to the problem of evolution. This is to possess more than casual and arbitrarily selected data. On the other hand, the theoretical biologist, in possession of the best available data, must exercise more than casual and arbitrary canons of judgment. The natural philosopher must extend his knowledge and application to sufficient organic details of nature to exercise judgments which are verified, not merely in the mind, but in the organic world. The theoretical biologist must extend his analysis to those requirements absolutely necessary for adequate explanation and interpretation. Here the natural philosopher and the theoretical biologist (as distinct from the biologist engaged solely with research) meet on common ground, both professionally concerned, both professionally respected. On this level of endeavor neither intrudes; both are at home.

The great disservice which modern thinkers have done to the cause of scientific biology and natural philosophy by driving a wedge between these two approaches to the organic world is markedly apparent in the important question of the evolution of species. Aristotle was much more wise and realistic when he founded and elaborated a systematic treatment of the world of living organisms in which the natural philosopher and the theoretical biologist were one in theory and in fact. Today,

in the name of formal professional exclusiveness,[57] these two disciplines are estranged, completely inadequate and incompetent without each other. If, because of the wealth of details of organic data available to us today, it is practicable to have some division of labor, the two must of necessity be re-wedded in professional co-operation. *For until the natural philosopher and the theoretical biologist, in a co-operative and professional effort, elaborate canons of biological methodology, and apply those canons to the best available data on organic process, the question of the fact and the theory of organic evolution will remain an unverifiable and unintelligible matter to both.* And only then can it be revealed to the educated world how best to evaluate *The Origin of Species* and Darwin's contribution to biological science.

Conclusion

One hundred years have passed since the publication of *The Origin of Species*, and the year has enjoyed the commemoration of this great event by biological and philosophical appreciations varying from the highly eulogistic to the more sober and critical view. Darwin's theory of natural selection has suffered great reverses, serious long-term decline, even in biological circles. Although the substance of his theory has been rejuvenated in the "modern synthesis," there are today many deep, unanswered questions. Even the extent of the fact of evolution has not been clearly determined, and to this day remains unsolved, as the Simpson-Schindewolf controversy reveals. Perhaps the development of organic forms takes place only within certain defined limits of major natural groups or families. This polyphyletic interpretation of the so-called "proofs" of evolution, and even the fossil record itself, is maintained here and there by biologists whose methodological position seems much stronger than their voices.

[57] J. Maritain, *Philosophy of Nature* (New York, 1951) pp. 116-18.

The climate of the neo-Darwinian opinion, however, continues to prevail as the orthodox position in America today, but close analysis of the issue makes it clear that we have before us a problem of eliminating arbitrary choice both of data and method. Evaluating the position of the neo-Darwinists demands a set of well-defined canons of biological methodology before we can judge rightly in the matter. It becomes the joint issue of the natural philosopher-biologist to elaborate such well-defined canons, and in this work, neither, in the name of professional respect, can do without the other. On this point, there can be no question of intrusion. Only when these biological canons are formulated and applied faithfully to relevant data can the thesis of *The Origin of Species* and subsequent evolutionary theory be rightfully understood and evaluated. When the fog of arbitrary opinion is lifted and professional biological and philosophical competence is firmly installed, the meaning and true value of the Darwin Centennial will be open to us. We await the day when theoretical biologists and natural philosophers join hands, and, with professional competence and mutual respect, make the true meaning of the theory of evolution available to us.

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The Ultimate Why of Evolution

by J. Roland E. Ramirez

THE QUESTION of one form evolving from another, of one kind of being giving rise to a different kind of being, was a subject of meditation for the early Hindus and Buddhists, for the ancient Greeks, the Fathers of the Church, thinkers of the Middle Ages and the Renaissance. Although man's native interest in the subject has persisted more or less through all periods of cultural advancement, this interest was accented after the Renaissance by the increasing scientific orientation of the West, leading to the work of men such as Erasmus Darwin, Buffon, Lamarck, St. Hilaire, and others, finally culminating in what was almost the obsession of the late nineteenth and the early twentieth centuries.

Today the countless distractions of the times and the almost unlimited number of pursuits absorbing man sometimes give us the impression that the earlier enthusiasm in the issues of evolution has subsided. This is no doubt largely deceiving, for a constant stream of publications and research in every direction indicates that the West's concern with evolution has continued practically without interruption since 1859 when Darwin's *Origin of Species* first appeared.[1] In point of fact, it is only in our own day that advances in geology, chemistry, biology, genetics, anthropology and other sciences have enabled us to explain many things which were not yet understood by Charles Darwin and Alfred Russell Wallace a century ago. Nevertheless, evolution remains in many respects as mysterious to us

[1] A recent work on the history of evolution with a useful bibliography is Philip Fothergill's *Historical Aspects of Organic Evolution* (London, 1952). Henry Osborn's *From the Greeks to Darwin* (New York, 1929) remains an important historical contribution to the subject.

as it was to the ancients and perhaps even more so. Whatever it has meant in the past, evolution continues to be a legitimate subject of wonder to man, and inquiries into its meaning continue to open new channels of thought and new paths for investigation.

Because the subject lends itself to various levels of approach, to say that this or that is the answer to the meaning of evolution tells us little unless we know what kind of a question we are asking and precisely what kind of an answer such a question requires. If we ask a geological question, a geological answer will be the most appropriate, and the same relation holds for the answer to a biological or a philosophical question. Neither Aristotle nor St. Thomas would have considered a biological thesis as proven if supported only by a philosophical proof.[2] Even less could we prove a purely philosophical question with a biological proof. This means that if many things relative to evolution have been established " biologically " which yet do not prove any subsequent philosophical questions, many things which prove nothing on the level of the special sciences can still become true objects of philosophical investigation and philosophical knowledge.

It is to the credit of the individual natural sciences that they have rightly refused in their special fields of investigation to be satisfied with philosophers' or theologians' answers transcending the scope of the particular levels of inquiry proper to natural science. No student of evolution can safely ignore the accomplishments of any of the sciences concerned. Keeping this in mind, we shall nevertheless restrict ourselves to a question which, while of capital importance to any synthetic grasp of the notion of evolution, remains primarily and essentially philosophical. Since the problems of evolution often straddle

[2] Cf. Aristotle, *Post. Anal.*, I, 9, 75b37 ff.; St. Thomas, *In I Anal. Post.*, 16 ff. This would particularly apply in the light of the modern status of the natural sciences.

the scientific, philosophical and theological domains, it will be at times difficult if not impossible to avoid touching on questions involving all three spheres.

I. The Problem

Finding the ultimate why of anything involves teleology, purpose or final causality. In essence the principle of final causality states that every agent acts for an end or goal, and that all agents which tend towards ends without knowledge or understanding of those ends do so in virtue of some intelligent agent who does know those ends, and who has impressed upon the agents in question, in a measure which corresponds to their particular nature, the inclination towards their respective ends. There is, in other words, such a thing as nature, and nature has an end and that end is known and put into nature by the Intelligent Author of nature.

It is very useful in any treatment of something as complex as evolution to distinguish final causality from efficient causality, material causality and formal causality. For obvious reasons this distinction is particularly necessary in an inquiry into the very purpose of evolution. Much of the confusion and perhaps many misunderstandings among those holding apparently incompatible views with reference to this subject arise from inadequate use of these valuable philosophical tools.[3] There is also the danger of attempting to answer too much on the basis of a purely philosophical consideration of these factors. The

[3] George Gaylord Simpson, for example, in his book *The Meaning of Evolution* (Yale, 1952), often appears to take the material, efficient and formal cause as a single element which he would call purely material. While this cannot be said to be false without qualification, such a simplification of the causal factors involved makes it easier for him to dispense with the need of a final cause. This is largely because the efficient cause, which cannot act except on the basis of some end, is not clearly grasped in its proper nature as something distinct from matter taken purely and simply. The difficulty remains whether or not the efficient cause is a purely material efficient cause or whether it is itself something existing apart from matter.

factual existence of many material, efficient and formal causal elements must be left to the investigations of the experimental sciences.

Our immediate concern here is with the final cause alone, the why, that for the sake of which, that to which something is ordered. We shall thus for the most part abstract not only from the how, from the source of action and from the matter or material elements involved in evolution, but also from particular empirical verifications of the why itself. Since the end is always first in the order of intention, thereby ultimately causing the causality of every other cause, in its perfect or complete manifestation it is last in the order of execution. This means that it initiates everything only to the extent that it is most radically in the intentional order, and as such it defies direct experimental or scientific investigation. It also means that, being fully attained only after everything else, an end or objective defies experimental verification not only in its very nature as a final cause, but in many cases even as a *thing*; that is, insofar as an end can be an existing reality even while not seen in its relationship of being that for the sake of which certain other things have been brought about or have acted. This is precisely the situation which prevails where the end cannot be said to be a single perceivable entity, where the whole movement towards the end is only in the process of realization and betrays no single directive purpose which could unmistakably be said to immediately characterize it. Since this is the sort of end we are confronted with in evolution, the why of evolution as a whole cannot lend itself to anything but philosophical (or theological) investigation. It necessarily involves to some degree going back before the given to the order of intention, and to some degree going forward beyond the given to the possible ultimate nature of the realized total product of that intention.

In seeking the ultimate why of evolution what we are seeking

particularly is its *specific* end, taking evolution universally as a whole process relative to the material universe. The evolutionary process is one which could lead us, let us say, from the formation of the stars to the formation of man's body or beyond, but for our purposes we shall restrict ourselves to living species as known on earth, and we shall exclude any evolving or evolved reality which in any way transcends the order of the material universe. We are not seeking the why, for example, of human psychological evolution, nor of moral, intellectual, and religious evolution, or the like. It is not that we think these things should necessarily be divorced from the more material or organic manifestations of evolution—although they very likely have a distinct purpose of their own—but simply that these subjects are beyond the scope of our present task, which is more modest and only of an exploratory nature.

On the other hand, we are not seeking the why of this or that particular manifestation of evolution in the material universe, nor of this or that particular evolutionary line or development. We are seeking only the why of the *whole* process. This refers exclusively to the physical, material universe with respect to our study of it on earth, especially as involving all forms of physical life, including man. Why, in other words, should there be different kinds of living beings arising from certain given beings? Why should we have one kind before we can have another kind? Why should one kind precede and another follow? Why not have all simultaneously? Why not have all one species? Why not have each species independently of each other? Why a sequence, why a difference dependent on a sequence, and why a dependent sequence? Our question is not whether or not this is possible nor how it comes about but: why have it? What objective can be thus brought about that would not be brought about otherwise?

Although our concern is with the why of the entire process, we could not be said to know the specific end of evolution as

such if we gave only an end which transcends its proper objective or purpose. If we said, for example, that evolution exists because God wills it to exist for his pleasure, this would be undeniably true and it would give us as ultimate a why as we could conceive. But this why is *too* ultimate. It is not proper to evolution as such. The same would hold for our saying that evolution involves a greater manifestation of God's glory, mirrors a divine attribute the only way visible creatures can do so or that it serves to accomplish the perfection of the universe or "adds" to the perfection of the universe.

When we refer to the why of evolution we shall be taking it in this restricted sense unless the context makes a different meaning explicit.

To keep our inquiry as incomplex as possible we shall not consider it our problem to prove either the universal validity of the principle of final causality as such, or the basic truth of evolution, or more exactly, that the evolutionary theory relative to the material universe and physical life as we know it is a valid hypothesis. We are not attempting to prove that evolution has taken place or is taking place, nor that final causality is operative in the universe. Our question is: Supposing final causality and supposing that evolution is operative or has taken place, does this process have a specific end or only as many ends as there are products of it; and if it does have a specific end, what is it? It goes without saying, of course, that the existence of such an end must be maintainable against arguments which—without necessarily denying the principle of final causality—would preclude the possibility of a specific end for the evolutionary process as we understand it.

II. Difficulties

Having delimited our problem, let us briefly examine some of the more pertinent objections commonly advanced against purpose or finality in evolution.

A first objection is that evolution apparently takes place in a random way, arising and proceeding as it were by chance. It is not even consistently random. Sometimes it proceeds in more or less progressive lines as is claimed, for example, in the instance of the evolutionary development of the horse, in the wide tendency for surviving animals to increase in size or in the more general tendency for the total given numbers of things to increase, whether we restrict this to life on earth or include under it things pertaining to the galaxies. Often, however, evolution stands apparently more or less still, as is asserted of the line of the sphenodon, an anomalous animal inhabiting certain islands near New Zealand, and of many of the lower forms of life. Again, sometimes it regresses or tends towards self-destruction, as in many so-called unfavorable mutations. There are times when it moves towards greater complexity and times when it does just the opposite, and so on. In other words, it is impossible to see any overall pattern or conceivable plan in its manifestations, and therefore evolution can have no definite goal or purpose.

A second objection is that in those particular evolutionary lines where we *do* see apparent direction or progression, leading, for example, to a hierarchy of higher animals with *homo sapiens* at the summit, we would not be accurate in saying that even singular results of this kind were by design; for among other things they do not explain the intermediary extinct lines branching out in all directions, including countless ones of which we have no trace. It could not reasonably be said, for instance, that a line leading to the giant reptiles, the brontosauri and the others, and which subsequently died out, existed in order to prepare the ground for a hierarchy of mammals which was to assume the ascendancy or to later replace it. Nor could we conclude that the existence of turtles, which can provide food for man or decorate his zoological parks, is ordered to this purpose; because all of this is quite accidental to the nature of

a turtle even if it may not be accidental to the nature of animal forms of life taken generally. We could not say, in other words, that the particular progression itself or the resulting hierarchy were the purpose of evolution, since compared with the whole process or with the total results, such a progression and such a result are more or less obviously accidental.[4]

[4] For St. Thomas something qualitatively higher can be properly considered the end or objective of something qualitatively lower. Thus, in a chapter pregnant with significance for the question of evolution, he states: ". . . the more an act is more ultimate and more perfect, the more the appetite of matter is inclined principally to it. Therefore the appetite by which matter seeks form must tend as to the ultimate end of generation towards the last and most perfect act to which matter can attain. . . . Prime matter is in potency first of all to the form of an element. While under the form of an element it is in potency to the form of a mixed body, and because of this elements are the matter for a mixed body. Taken under the form of a mixed body, it is in potency to a vegetative soul . . . the vegetative soul is similarly in potency to the sensitive, and the sensitive to the intellective. . . . After this form no ulterior or nobler form is found in things subject to generation and corruption. The last end of the whole of generation is therefore the human soul, and matter tends to it as to its ultimate form. The elements, then, are for the sake of the mixed body; the mixed body is for the sake of living things; and of these latter, plants are for the sake of animals, and animals for the sake of man. Therefore, man is the end of all generation in its entirety. . . . If, therefore, the movement of the heavens themselves is ordered to generation, and if the whole of generation is ordered to man as to the ultimate end of this genus, it is manifest that the end of the movement of the heavens is ordered to man as to an ultimate end in the genus of things subject to generation and movement." *Sum. cont. Gent.*, III, 22. We have quoted this passage at length (our own translation) because all of it has application to our problem. Just as matter can in a sense be said to have for its end the highest product involving matter, so can evolution be said in a sense to have for its end the highest product resulting from evolution. Nevertheless, the *whole* process taken in itself cannot have this as its *specific* end unless we say that all the myriad developments which have not directly led to man are completely irrelevant to it, having no meaning apart from man—something which would appear absurd in the light of the countless worlds which may exist, the countless beings that have existed unknown to man and without necessarily affecting his ultimate existence, and the countless more that perhaps will exist in the future quite irrespective of his existence. The evolutionary line culminating in the ichthyosaur finds meaning in the ichthyosaur with or without man. Lower forms of life can in a very true sense be said to exist for higher forms, but even if man is the summit this fails to explain why there were thirteen species of finches in the Galapagos in 1835.

A third objection is that no theory of finality (whether we assume a universal tendency of nature towards perfection with Aristotle, Dionysius the Areopagite, St. Thomas, Lamarck, and others, or deny this with the later evolutionists) can adequately explain or account for the numberless individuals that develop only partially or not at all and which nature apparently intends. Regardless of how we answer the second objection, which is based more on the problem of the countless species, general types, or the like, with their hierarchical or non-hierarchical arrangement, we have still to explain the individuals. Why some individuals come to be at all as well as survive rather than others is manifestly a matter of chance, depending as much on the extrinsic conditions of time, place and surrounding factors—including cosmic rays and explosions of stars—as well as on any presumed designs or inclinations, shortcomings and adaptative powers of individual natures. And at any specific stage of evolution or individual development which we could say was proceeding according to plan, cataclysms —including atomic explosions—or physical upheavals could arise which would alter their course by direct destructions, organic or genetic mutations, isolations, or by new migrations, adaptive radiations or possible new beginnings. Even if we could accept that all this was by design for the sake of precisely what would result in the survivors and their successors—would this truly explain all the phenomena: the irregularities and the truncations, the vastness of the apparent total failures, of the partial failures, of the irrelevancies? And let us remember that our concern is with the why of such phenomena. The how is easier to see.

A fourth difficulty is the evil inherent in the life-death cycle, the generation and corruption which is inseparable from evolution as we know it. In the domain of living things where death is manifestly an evil and where the life of one thing involves the death of other things, it would seem impossible to reconcile

this with any overall purpose. For an end by its very nature has the character of good and therefore cannot explain evil, especially since we suppose that the Author of nature could not or would not intend evil. Similarly, it could not be said without qualification that the death of some living things always involves the good of other living things. It is not, therefore, a satisfactory explanation to say that the death of the things which die is intended for the good of the things which are to survive or to follow. It makes no sense to say that the unfit exist for the sake of the fitter or the fittest, for, among other things, it cannot be proven that this is always the case and it is manifest that very often a greater good is thus sacrificed for a lesser one, as when a tiger or a cobra kills a man, or when a virus or bacteria or any lower forms of life destroy the lives of higher living beings. The only way to explain such happenings is by implying that in general they were *not* directly intended by nature. But even this cannot always be maintained, and it leaves only chance as an explanation. On the other hand, the manifest evils of the life-death cycle are obviously too general and too serious to be discounted. If death were a matter of chance we would be saying that an essential or at least a capital element of earthly existence is not intended as such. But this again is no more than to deny purpose or finality to the evolutionary process which has brought about the development of life only to follow it up with death, and that of death only to follow it up with life.

There are other objections to purpose in evolution, but if we can answer these four we believe we shall have overcome the most fundamental difficulties.[5] On a first inspection they appear

[5] The objection frequently made by those holding to exclusively materialistic explanations of evolution, that purpose and/or a First Cause need not in any way be introduced because without recourse to them evolution can be adequately accounted for on purely materialistic grounds, should perhaps also be discussed. This objection, however, presents itself as a precluding factor only on a non-philosophical level; and it could be taken as a possible

perhaps discouragingly formidable. Indeed, they are for the most part unanswerable so long as we make no distinctions as to what evolution necessarily involves by its very nature and what it need not involve. Only after we consider evolution more closely, distinguishing it from other factors co-existent with it, will the difficulties begin to lose some of their force.

III. Clarifications

Before directly answering the objections, then, let us attempt to clarify somewhat our concept of evolution so that we can refer to it without equating it with things that in themselves are distinguishable from the evolutionary process taken in itself. This analysis will be for the most part an isolating process carried to a level which would not be necessary in a purely scientific consideration of evolution. To discover the precise purpose of evolution it is necessary to isolate the evolutionary process as much as possible from any factors—even those which it presupposes or implies by its very nature—which could actually or hypothetically exist apart from the evolutionary process itself; for these factors could have a finality other than that of evolution as such. We do not pretend to carry this analysis to a completely satisfying degree of perfection but are merely doing the minimum to enable us to come to grips with the precise question before us.

application of the principle of economy only by those who deny all true intelligibility to the principles of formal and efficient causality. It is clear that any attempt to account for nature in any sense of the word by exclusive recourse to the properties or laws of matter simply begs the question. It is tantamount to saying that since the movement peculiar to a clock can be adequately accounted for by the gears and the spring or the electricity, it need not have any intelligent designer nor any foreseen or intended purpose. But the problem is precisely that the movement peculiar to a clock *cannot* be *adequately* accounted for by the gears, spring or electricity.

A. *Evolution and the Material Universe*

Beginning with the widest spheres that might be confused with evolution proper, let us first say that evolution, taken even in the broadest sense, cannot be equated with the material universe. Although sometimes we may be tempted to think of evolution as the life-force or the basic reality in the universe, it is nevertheless not itself the universe but only a process operating within it. "Why evolution" is thus not the same question nor for that matter as ultimate a question as "why a material universe." We could not, therefore, say *a priori* that knowing the answer to one of these questions necessarily implies knowing the answer to the other. For this reason we cannot simply assume that the distinction between evolution and the material universe is a superfluous one, too obvious to mention. Once we distinguish between the material universe itself taken abstractly and certain processes operating in it, we see that, at least theoretically speaking, a material universe could very well exist without entailing evolution, whether or not this actually is or has ever been the case for the material universe presently under our consideration. Even if we went so far as to conclude that by its very nature any material universe would have to be "evolvable"—something which cannot be proven—we would still not be justified in concluding that it would therefore have to evolve in fact. Nor would we call a simple cycle, for example, of A to B and B to A, extending forever in a simple recurrence, evolution. Evolution implies more than this.

Not only is evolution not the same thing as the given material universe taken globally, but so far as human knowledge is concerned, it is not even a specific given concrete material datum nor a collection of specific given concrete data. It is only a process and a process for the most part to which we conclude, using given data as our point of departure. We conclude to this process because it can partially explain certain data, and

thus taken, we are justified in assuming that it is instrumental in their production. Nevertheless, the process itself can always be distinguished from the data as such and should be thus distinguished. The evolutionary process leading to the existence of the first platypus was not itself a platypus nor any other kind of animal, yet we assume that the (resulting species) playtpus, which alone is now given, requires species of animals other than the platypus to account for itself. Taken alone, however, the animal forms which preceded the platypus are also unable to explain the platypus. We require *in addition* an evolutionary process allowing for the bridge or bridges from the prior to the posterior forms. What has come about through evolution is thus not itself evolution but a product of evolution plus something else, and it matters little here whether this product is "static" or in an imperceptibly evolving state. Again, it makes little difference in this regard whether the product or data comprise one individual or many varying individuals, one skeleton or many skeletons. Even when the individual "evolves" from its initial cell or cells to the final product, our knowledge of this implies many inferences, inductions and deductions implying much more than that individual's evolution.

Quite apart from this, of course, evolution in some of its particular manifestations can be taken as the practical equivalent of a direct object of experience even outside of the individual. Experiments with things such as plants, fruit flies, birds, and so on, established this beyond reasonable doubt a long time ago, and recent advances in the study of genetics have made possible even more striking experiments, including artificially induced mutations of all sorts. In 1830 this would have been more than enough to decide the issue on the question of the mutability of species—so vigorously contested between the school represented by Buffon, Lamarck and Geoffroy St. Hilaire, and that represented by Linnaeus and Cuvier. But no matter

how true or verifiable evolution might appear in particular instances, and whatever this might mean to certain evolutionists, it is nevertheless undeniable that evolution taken as a whole is never a fact in the sense of a given experimental datum. Even if the geological data were complete, the facts or the data which might prove evolution are not themselves evolution.

We distinguish, then, between evolution itself and its evolved products, the data of evolution. Here again, as with a material universe, we can say that hypothetically there is no contradiction involved in saying that the products or data of evolution could exist without an evolutionary process having been required to bring them about. Abstracting from the problem of whether evolution is or is not the most likely explanation for the data, we cannot deny that the very same data, the very same individual beings, could receive direct existence quite apart from the evolutionary process, no matter how unlikely this might be in actual fact. This is conceivable and it is at least an ontological possibility.

We must go a step further. If evolution as a whole process cannot be equated with any specific material being given here and now, neither can any material being ever given nor any collection of such beings ever be evolution. If at the beginning of everything we would have a single matter or material being, this "thing" would have to have some form and such a form would be prior to any evolutionary process. Evolution supposes *formed* matter. Even if we held to an eternally evolving cycle, matter of some definite actualized form no matter how illusive would have to be presupposed in one way or another within the cycle, as indeed it would have to be by anything else in and of the material universe. If evolution came to be, it is because formed matter existed or was given existence; whereas if matter existed or was given existence, it is not because evolution began. In other words, even if the beginning of formed matter and of evolution coincide in time, formed matter

is prior in nature. And if they do not coincide in time, formed matter can chronologically precede evolution, but not vice versa. Thus, underlying every evolutionary process, matter itself remains as it were indestructible.[6] In each particular phase of evolution, we can say that formed matter somehow precedes it, persists through it and remains after it.

It does not necessarily follow from this that evolution is ordered to formed matter as to its end, nor that formed matter is similarly ordered to evolution. We are simply saying that since evolution presupposes formed matter, whereas formed matter need not presuppose evolution, formed matter must be considered more primordial than evolution.

Just as evolution cannot be the whole of the given nor what is primordially given in the material universe, neither can it be what is ultimately or finally given. It cannot be considered as ultimate in any particular given context, nor in the total most universal context; for what is finally given could at best only be what evolution somehow serves to effect. But evolution cannot be equated with its own effect—not any more than we can say this or that fossil is itself evolution. If, then, evolution really has a specific or ultimate goal, either this goal itself serves as a term to evolution, or it is itself further ordered to another goal or goals which will serve as its term. These goals or terms could not all be evolution as such but would have to be in some degree something beyond evolution. Thus they, not evolution, would be what is ultimately given.[7] In other words,

[6] As a primary "subject" of any act, matter is incorruptible. Cf. *Sum. cont. Gent.*, II, 55, 79. The reference is to prime matter, but we could also apply it, the way we have been taking it, to matter with *some* form, so long as we do not specify the form.

[7] It could always be asserted, of course, that there never will be something ultimately given, that there never will be a term and that evolution will continue *ad infinitum*. Although both scientifically and philosophically much would tend to make us reject it, there is theoretically no necessary contradiction in maintaining the perpetuity of evolution so long as we understand that by its very nature this could involve only a part, and that

just as matter can be and is ordered to form,[8] so evolution can be and is ordered to form. Form is its ultimate result and serves as its terminus. On the other hand, formed and existing matter is not ordered to evolution unless it be for the sake of another form. It may often appear that matter or form are ordered to evolution, but this is only because that evolution in turn is further ordered to form. In the final analysis it is not the evolutionary process itself but matter or form or both together that are most radical as well as most ultimate. Evolution is possible only if we already have a material form or forms which are *not* the result of evolution and if these are ordered to more ultimate forms, which while resulting through the instrumentality of evolution, must ultimately terminate evolution and go beyond it.

B. *Evolution and Change*

We have distinguished between evolution and the material universe and between evolution and any given matter. We must also distinguish between evolution and change. Evolution as we understand it cannot be taken to mean change purely and simply.[9] Change considered as such is more universal than

an inferior and dependent part, of what is. Such an evolutionary process would thus still require as its purpose a relationship to something lying outside of evolution in addition to the end we shall propose here.

[8] When we use the simple word "matter" we do not generally mean prime matter in the Aristotelian and Thomistic sense, but rather any basic, or if necessary the most basic—whatever that might be—material reality involving both matter and form. "Formed matter" may sound redundant in some contexts, but we have used it to avoid the possible confusion of this with prime matter. We have nevertheless found it unavoidable at times to use both "form" and "matter" even when the "matter" in question already implies form.

[9] Evolution has sometimes been defined as "change through time." This is simply to say that it is the equivalent of change, at least where material beings are concerned. Such a definition fails to explain why all the controversy over the concept of evolution did not arise over the concept of change, something universally accepted of all material beings and hardly contested since the time of Parmenides.

evolution, and can be taken to include non-evolutionary types of motion. Although evolution cannot exist without change, change can exist without evolution. We can say evolution is a particular type of change, but only beyond a certain degree of complexity, entailing a development or an unfolding of material forms which can be said to move towards different forms or higher or lower forms, whether these be simpler or more complex. As with all types of change, evolution always involves the coming to be of one thing from another, but this must continue beyond a certain degree of variation, whether " progressive " or not. Evolution will thus always suppose a considerable gradation over and above simple change, something not unlike the *dégradation* of Lamarck. Ultimately we can say that by evolution we mean the specific process which, entailing a multiplicity of changes, constitutes the motion from one type of living material form to another type. It is only with the introduction of living forms (and perhaps already with forms at the threshold of life) and the complexities of their particular transmutations and development that we can say evolution takes on the full richness of its meaning. At the same time it is also in the domain of life-forms that it has the most precise significance. When we are no longer able to know what it is that changes to what, as with sub-atomic particles and the like, we are only prematurely projecting extraneous hypotheses in speaking of evolution.

We do not say that *any* series of changes within a living species or type is already evolution, but only a series of changes ultimately able to vary the species or type in question. If the change indefinitely reverts simply, as it could with certain elements, to compounds and vice versa, or even with water to steam, water to ice and ice to water, we would not yet call it evolution. Granted that these changes no matter how simple are implied by evolution, we are begging the question to identify them purely and simply with evolution; for no one questions

or takes issue with these, whereas this is not true of evolution as what it is now generally taken to mean. No one has ever denied that there are physical differences between a man and his son, but this is not yet a justification for saying that "fish" forms could have evolved to anthropoid forms, or that lower animals can evolve to higher animals. Only when we can first identify distinct species or types of beings and link them to each other through numerous changes resulting in a motion of forms from one to the other can we say that we have evolution properly speaking. We can then subsequently apply this term analogously to less clearly identifiable entities and processes. It would thus be only an analogous application of the term "evolution" to say, for example, that matter [10] *evolves* when it changes to light or radiation. By evolution, therefore, we mean change only in a special and restricted sense. We shall not take it in the very broad sense in which it becomes co-extensive with change. Our meaning is not intended to be the equivalent of Spencer's definition,[11] nor as inclusive or comprehensive as notions proposed by many thinkers who have attempted to make evolution absolutely all-embracing.

As with any type of change or movement involving the material universe, the element of time necessarily enters into the notion of evolution. There can be no evolution of one thing from another if we suppose that both things come to be simultaneously or if both things have always existed as such. Nor

[10] Matter here no longer means what we take it to mean throughout this work, but is taken, as it is often employed in modern physics or astronomy, more or less as mass in "opposition" to light or radiation. Cf. Louis de Broglie, *Matière et Lumière* (Paris, 1937); Sir J. Jeans, *The New Background of Science* (New York, 1933); Sir A. Eddington, *The Expanding Universe* (New York, 1940), etc.

[11] "Evolution is an integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation." E. Spencer, *First Principles* (New York, 1900) p. 334.

is there evolution if we suppose a universe of spheres perpetually moving in a circular motion without alteration of any sort. Just as there is a certain inevitable continuity in time, there is a certain inevitable continuity in evolution, in the sense that if there is a transition from one species to another, there are limits to the abruptness with which such a transition could be made. If the jump is too great it could not be called evolution but rather something closer to a new creation or simply a new creation. The dictum *natura non facit saltum* is not discredited but rather corroborated by evolution. Evolution is a staunch ally of secondary causality as opposed to a pantheism which would deny it. It is not unlikely that the evolutionists themselves—those at least who accept the more modern scientific developments pertinent to the subject—would be the last to maintain that the physical being, man, could directly descend from a monkey. Geoffroy St. Hilaire's suggestion that the first bird might have been directly produced from an egg laid by a reptile would be as absurd to a contemporary evolutionist as to someone rigidly holding the doctrine of the direct creation of species. Nevertheless, within a limited context of continuity, certain " jumps " are certainly possible. But no matter how strange such jumps seem to those following too rigid an interpretation of the continuity of evolution, they are not exceptions to continuity but rather suppose it.

C. *Evolution, Distinction or Diversity and Community*

Another distinction which needs to be made is the very delicate distinction between evolution and the multiplicity or diversity of individual beings and of species or kinds of beings manifestly present in and comprising as it were the material universe. Things are diverse. They are distinct, many, and other or different. No two are completely alike, and the difference is such that it would be absurd to say they were all intended to be alike. So far as man can tell, this difference

or diversity in material beings is a fact and we have no reason to suppose that any two existing things in the universe are completely alike if they are truly two.[12] Even the identity of two atoms of the same kind can be said to hold perfectly only in our minds, much like the congruity of two triangles in plane geometry. Diversity becomes more marked as we ascend the evolutionary line to living things, so that in general there is more room for all types of diversity between two higher animals of the same species than between two plants of the same species. If we include men, an even greater diversity potential exists. It is quite obvious that the differences between two men can be far more extensive than the differences between two individuals of any lower species.

Evolution supposes diversity, both actual and potential. Unless there were diverse things given to us, unless diversity were an undeniable phenomenon, it would be impossible even to conclude to any evolutionary process as operative and instrumental in the production of these diversities. Granted, however, that diversity in things as an accepted phenomenon must necessarily be recognized and observed before we can formulate any evolutionary theory, diversity itself does not and could not as such give rise to the notion of evolution. No one aware of a Cedar of Lebanon, a symphony orchestra conductor, a whale, an amoeba and a hydrogen atom would be led because of their diversity, because of their differences, to seek even a partial explanation of those differences in a theory stating that perhaps forms of simpler type or even one same stuff had gradually developed into all or some of them. Differences do not imply evolution but only other differences. Not only is evolution not necessary for such differences to exist absolutely—they could

[12] We shall not enter here into a discussion of whether multiplicity or plurality precedes otherness or diversity or vice versa. Cf. St. Thomas, *In Boeth. de Trin.*, II, 1. By diversity we shall mean distinction, multiplicity or otherness without going into the differences between them.

very logically be considered products of the Divine Art executed simply by direct creation—but evolution cannot in any way truly *explain* differences taken simply as differences. Diversity cannot be made intelligible by evolution, no matter how conceived. What evolution partially explains is *similarity* in differences, and even this only with certain qualifications. Although it may appear to do so on the surface, evolution does not really help us to understand why things are diverse, but rather—given the fact of their diversity—it helps us to understand why they differ only to this or that degree or, in other words, why they are not more diverse than they are. It helps us ultimately to see that, from a certain point of view, things may not really be as diverse as they seem to be at first glance. This explains the importance of fossils, arrested types, the remains of intermediary stages, "missing links," and so on. Without their mitigation of the differences no evolutionary theory would be taken seriously on purely natural grounds. When the evolutionary theory accounts or helps to account for certain differences by showing us many details of a process in which one thing can evolve to a second thing varying in some degree from the first, it does not in any way tell us the ultimate cause of the diversity nor why such a diversity should be, but only *that* it does result or could result in this or that case. Given the fact that diversity is or is to be, evolution contributes certain factors which cannot be easily dismissed and which tell us that in such and such an instance this difference rather than that difference could result or not result. But even in doing this, it accounts most fundamentally not for the diversity which can result but rather for the unity, continuity, kinship or similarity of material things which can change and be subject to such differences. What evolution tells us that we could not as readily see without having recourse to the theory, is, then, not even that things differ in this or that degree, but simply that

these things which we *observe* to be different and changeable have something common.[13]

This something common is something besides a possible community of form, a common nature, definition, pattern of behavior, outward appearance, chemical or atomic composition, and the like. Evolution signifies that certain diverse things have in common a more proximate origin than the initial act by which the Creator is presumed to have established either the material universe or each possible separate species within it. They have in common an ancestry of material forms going beyond the first ancestor of their present form, and they have also in common all the intermediary stages of ancestry which pertain to each particular case under consideration. It is precisely this common factor which could pass unappreciated without the theory. It is the community or the continuity between the different observed stages and which involves a common matter handed down as it were from one stage to the next that is the positive element proposed by evolution. For this reason the evolutionary theory in general is an inference or a conclusion and can never be a fact in the sense of something given to us in experience except in those very restricted areas where the precise community it proposes to us can be the equivalent of an object of direct observation.

Unlike this, the general distinction, multiplicity or diversity

[13] Perhaps this should be taken into account in considering the position of those who deny the evolution of species altogether or in certain of the more doubtful applications of the theory. Since the most radical cause of the ultimate diversity present anywhere can never be explained by evolution, introduction of the divine causality or some other causality is no less needed whether evolution be accepted as instrumental in aiding to bring about a particular diversity, or whether this diversity is said to be the result of the simple execution of the divine intention by the immediate production of diverse things through direct creation. Nevertheless, if we judge the question exclusively from the scientific point of view, such a consideration could remain extrinsic to the invesigator's purposes. A man such as Darwin could very well have completely misunderstood this without detriment to his cause, his contributions, or his valid scientific conclusions.

of things as such, is for the most part self-evident and absolutely speaking need not have any connection with an evolutionary process. In fact, the natures of most individual material beings which we believe to evolve or to have resulted through evolution would not be essentially changed if we considered them as existing in a state where their individual diversity would be created complete and maintained thus without any evolutionary process. Whether or not we can point to the precise essence, nature or definition of a kangaroo, an okapi or a lemur, nothing precludes the possibility of direct creation by God of each individual of these species in its mature or completed state without evolution. The evolutionary process is not of the essence of what they are formally—not any more than their progenitors are nor even their act of existence—and is thus not implied by their individual nature. The evolutionary process is only a particular way or possible manner of bringing about resulting individuals which happen to have this or that nature. It is in no way the cause of this or that essence or nature formally and absolutely considered.[14] Since it is not the cause of any nature as such, much less can evolution be considered the cause of diversity as such; for differences of nature are only one manifestation of diversity.

Evolution may not explain diversity, but it does give us a valid explanation for a certain similarity of diverse things. If we ask why men and other animals resemble each other in

[14] If we say that the very nature of these animals is to be in a perpetually evolving state, we thereby preclude all intelligibility to nature and strictly speaking would have no grounds for saying that diversity existed. But if diversity is not known to exist we have no ground whatever for supposing that there is such a thing as evolution or even change in general. As St. Thomas so well puts it, "nihil est adeo contingens quin in se aliquid necesarium contineat." Similarly, nothing can be so subject to evolution that it have nothing in it which escapes being subject to evolution. One of these things is the nature that we name at any "abstractable" stage of the evolutionary process, particularly the stage we would now call the mature kangaroo, okapi or lemur.

certain physical properties, muscular reactions, patterns of behavior and even in certain facial expressions, the answer "because they have a common material origin" is, in its own plane, perhaps as instructive if not more instructive than the answer "because the hierarchy of living beings is more complete with such similarities than otherwise." Similarly, if we ask why certain types, species or varieties of animals resemble each other more than others, the answer "because their ancestry is the result of closer evolutionary material community or of closer related conditions for development than that of other animals, and so on" is in many ways more enlightening than to say "because that is their nature," even if both answers should happen to be correct. A given similarity thus logically leads us to conclude to an ancestry or community which could have been authentically such only through the instrumentality of evolution. The common origin or ancestry explains the similarity only if an evolutionary process has been at work, an evolutionary process which enables us to conclude that the differences between stages are not really great enough to preclude the continuum of ancestry. Evolution is thus necessary if we are to have a continuum. Without it we could not maintain the continuum of material community or of material ancestry through a diversity of forms or natures.

Similarity between higher material beings can exist without our positing a common ancestry. It could result from direct creation or by completely autonomous or accidental parallel development, as in two different worlds unconnected with each other, and perhaps in other ways. To establish, therefore, that in any given instance it is the result of common ancestry is a contribution leading us to one of the basic causes of similarity in that particular line. Ultimately, we would perhaps presume a single or unique source or a common material stuff at the basis of the similarity, regardless of how we conceive it. The most ultimate unity or community would thus be at the basis

of all subsequent similarity and would ultimately explain it in one way or another. This would still suppose, of course, the presence of diversity, since there can only be similarity if we have more than one thing or a plurality of some sort. It is thus always a similarity or a community *in diversity* which has as its basis a common matter or a common ancestry.

If we suppose a particular common basis for a respective resulting similarity, however, how are we to account for the diversity of similar things? A given diversity in the material universe has to result from certain differences which are somehow already present, whether or not there is common ancestry, direct creation, or parallel development, and the like. To establish more in detail what some of these differences are or involve (as has been done in modern scientific laboratories, and so on) never really leads us to an ultimate cause of liversity in any given instance. On the other hand, we cannot posit an antecedent diversity as the ultimate source or basis of all subsequent diversity, for this would be to go on to infinity and merely avoids the issue. Neither can we ultimately come to a "unique" diversity or distinction at the source of all others which would in fact be something actual. An absolute unity can be at the basis of something—it can be the source of the unity or community of diverse things—but an absolute diversity or distinction cannot be at the basis of anything for the simple reason that such a diversity is an impossibility. We could only come finally to the fundamental distinction between being and nonbeing which, in its role as the first principle of the mind may indeed furnish the ultimate explanation for any actual diversity,[15] but this is only *if* a plurality or diversity already exists or is actually to exist. Prime matter as the ultimate potentiality explains in a similar way how certain differences that at first are merely potential ultimately become actual. But

[15] Cf. *In Both. de Trin.*, IV, 1.

why should there be "anything" at all which can be a potentiality to such differences? Teleologically we cannot say that there are differences because there are potentialities for differences, but rather the opposite. The distinction, the diversity, the "more-than-one-thingness" of what is not itself God must somehow precede the potentiality to distinction or to multiplicity. In this sense matter or potentiality does not explain diversity but it would be better to say that diversity explains matter.

Our only conclusion from this is that material diversity cannot be explained by any or all the elements making it material. It obviously cannot be explained by material community, and it cannot be explained by any actual or potential diversity of material forms. It is not for the sake of two or three forms that we have diversity, but it is rather for the sake of diversity that we have two or three forms. The specific final cause of material diversity in any given instance is really identical with the ultimate cause of all diversity universally considered.

With similarity or community we need not go so far. If community in being were the final cause of all similarity, for example, the specific similarity of material beings having a common ancestry would not be caused by a simple community in being but by a community in all that matter and a material ancestry positively entails. Matter is a more specific positive basis of community over and above community in being or existence.[16] Can we say, however, of any two distinct material things that their distinction or diversity—their "two-ness"—has its specific cause any more in matter than in something other than matter? To ask why two beings are distinct in any way or why they have distinct "matter"—to ask why two

[16] Matter as a formed substratum is something positive and it could be deceiving to look at it merely as prime matter or pure potentiality. It is not merely pure potentiality but something actual which is the basis of material community.

beings are two or why they have "two matters"—is ultimately to ask the same thing. To ask why two beings are "one" in any way or why they are "one in matter" is not the same thing. This means that matter can explain a particular community of diverse forms but not their diversity.

Matter is really ordered to diversity without explaining it. In any actualized form matter precludes by its very nature the perfect actualized unity of pure immaterial being, and can only exist for the sake of diversity or greater diversity. But why we should have diversity itself nothing within the material universe can explain.

How does all this help us with the why of evolution? It really strikes at the very heart of our problem because it tells us that it is the similarity and community of material beings which can be rendered somehow more intelligible within an evolutionary context, whereas to become equally intelligible the diversity or distinction of material beings requires us to go beyond or to transcend any evolutionary context.[17] If community and diversity, which in the final analysis are always in some way correlative, are both at the basis of the specific finality of evolution, we can only conclude that community is a more specific end than diversity. Evolution is as it were more closely linked with community, but this material community itself is somehow for the sake of diversity,[18] so that ultimately both

[17] Community or similarity as such taken absolutely would also transcend an evolutionary context. Our point is that, contrary to what it may often seem, a certain *material* community can be made intelligible by the evolutionary theory whereas this is not true of any diversity.

[18] St. Thomas implies this somewhat strikingly when he says: ". . . the distinction of things is not for the sake of matter, but rather, on the contrary, matter was created with formlessness in order that it might be accommodated to diverse forms." *Summa Theol.*, I, 47, 1. Cf. *Sum. cont. Gent.*, II, 40. If the very formlessness of matter, which we may take here on any level and not just on the level of prime matter, is for the sake of diversity, obviously matter cannot explain or be the final cause of diversity but rather diversity must have an end beyond matter or material community.

evolution and material community are further ordered to distinction or diversity.

D. *Evolution, Secondary Causes and Hierarchy*

Another distinction which cannot be overlooked is that between evolution and an acting order of material secondary efficient causes. We can certainly have an order of secondary causes which are material beings without having evolution. It may be, perhaps, that most of the secondary or instrumental causes in our world would not be true causes at all if we were to abstract them from the evolutionary process in which they are operative. Nevertheless, a being possessed of human nature could be considered as existing outside of the evolutionary process and still be a being possessed of human nature. What might change is that he would not exercise altogether the same secondary causality and thus could not be considered to be exactly the same secondary efficient cause. A reptile, for example, which by hypothesis is created outside of the evolutionary process, would still be the same kind of reptile but it would exercise no secondary causality towards the production of a bird. Within an evolutionary context, the same reptile would always exercise some type of secondary causality of this sort.[19] In a material universe theoretically free from evolution, we can conceivably have the same diversity of natures and of individual beings as can exist in a material universe where evolution is instrumental in bringing about the diversity.[20] We could not say the same thing about the order of secondary causes. Many true secondary causes could not exist at all as such without the evolutionary process; that is, they would be such within an evolutionary context but would cease to be such outside of the

[19] Assuming, of course, that this reptile was among those reptiles in the line leading to birds.

[20] A possibility which, perhaps fortunately for his work, Darwin was unable to see.

evolutionary process. Although it can be distinguished from evolution, the nature of the given order of secondary causes is thus intrinsically involved with evolution and in a certain way even more so than matter or diversity abstractly considered. More about this will follow.

A final distinction to be made is that between evolution and the hierarchy of material beings or more precisely the hierarchy of living material beings. Hierarchy is essentially a qualitative consideration. It is thus difficult to speak of true hierarchy apart from life-forms; that is, without implicitly basing it purely on quantitative considerations such as physical energy, size, durability, or complexity of organization. Because of this, it would not always be proper to refer to hierarchy except where we reach the level of life; yet we do know that there at least, we have hierarchy. This hierarchy of living things, however, is not evolution, nor is evolution this hierarchy. That the two are distinct is manifest from the fact that they do not necessarily imply each other. Thinkers who accepted the hierarchy of species without accepting the evolution of species were not necessarily mistaken in their conclusions referring precisely to the notion of hierarchy. A material hierarchy brought about with the aid of evolution can remain a hierarchy even after evolution has ceased, and an immaterial hierarchy would not involve evolution at all. We can have true hierarchy without evolution, and we may also to some extent have evolution without having true hierarchy.[21] We shall return to this point.

[21] According to our qualifications as to the nature of evolution it might appear that evolution necessarily involves hierarchy. This is so only if we take every difference of nature to be a hierarchical one. For example, is there an order of nobility among camels, elephants, zebras, horses? If we maintain that every type of living form is either below or above some other qualitatively, then evolution would necessarily involve hierarchy; otherwise, it would not. In at least one place St. Thomas seems to imply that every formal distinction requires inequality. Cf. *Summa Theol.*, I, 47, 2. In either case, however, evolution would not necessarily involve any particular hierarchy, nor would hierachy necessarily involve evolution.

IV. Recapitulations and Conclusions

Up to now our analysis has involved introducing a number of factors which must be distinguished from the evolutionary process considered in itself, and which we consider fundamental in any attempt to find the precise end or ultimate why of evolution taken as a whole. Besides the material universe in its totality, material beings as such or matter abstractly considered, we mentioned change in general or the changeability or actual presence to change of material beings. There was the multiplicity, distinctness, difference or diversity of material beings as well as their community; the given or known order of secondary causes; the given or known hierarchy of living beings.

Most of these factors can in general be said to be more manifest than evolution itself and all of them are implied by evolution in one way or another. They are not all given to us in exactly the same way nor with the same degree of immediacy, nor can we put them all under the same Aristotelian category or predicament. Some suppose more universality than others, and some suppose more intellectual awareness in the observer than the rest. Community and the order of secondary causes are in a way more intrinsically involved with the evolutionary process than any of the others, although evolution necessarily implies matter, diversity and change.[22] The given hierarchy of living beings is not absolutely implied by evolution taken as such, but it is implied to some extent by the course that evolution has taken on earth, namely, one embracing a context of evolving living material beings ranging from simple cells to man. In such a context we can perhaps say that the more perfect or the more noble the beings involved, the more perfectly

[22] Few things are more striking in a man such as Charles Darwin than his meticulous awareness of secondary causes and his relentless and optimistic attempt to find the true relationships between orders of secondary causes whose existence as such he always took for granted whether or not he understood the nature of their connection with the First Cause.

evolution itself can be realized; because the secondary causes involved will be more perfectly causes; because the material community involved will usually be greater—and these, as we shall bring out further, are the major keys to the riddle of purpose in evolution.

Evolution necessarily implies all these things but cannot be identified with them. What is more, except for some qualifications with respect to the community of ancestry and to certain secondary causes, none of these things as such necessarily implies evolution, and theoretically they could all exist without it. If St. Thomas was mistaken [23] in supposing that the heavenly bodies of our present universe exhausted the potentiality of their matter or in supposing that they were not subject to corruption *ut sic*, this is not to say that it is intrinsically impossible for any material being which is truly one (in virtue of some form) to retain its unity without corruption in fact, whether or not the potentiality of its matter is actually exhausted. If this were intrinsically impossible, the human body could not share an immortal life with the naturally incorruptible human soul,[24] something which in itself is neither provable

[23] He did not necessarily take physical conclusions of this type to be absolutely certain.

[24] Here let us note that if we accept the evolutionary theory with reference to man's body, the step from earlier primates or hominoids to the first man possessed of an immortal soul would require something beyond the heretofore given "properties" of the matter at hand in order to produce an incorruptible body. According to St. Thomas, only God Himself could have given incorruptibility to the body of the first man, so that this would seemingly be something beyond nature. (Cf. *Summa Theol.*, I-II, 85, 6; *De Ver.*, XXV, 7; *Comp. Theol.*, 152, 186.) Nevertheless, for St. Thomas matter is somehow made incorruptible and must therefore be susceptible of factual incorruptibility consistent with the natural incorruptibility of the soul. In a hypothetical being created directly as incorruptible and composed of matter and form, the difficulty of conceiving this as natural would not be the same as in the case of the resurrected body or in the case of one individual suddenly arising immortal from a corruptible world and from a consistently mortal ancestry dating back millions of years. In other words, an immortal body may well be "preternatural" in relation to our present

nor disprovable. Hypothetically, it is not impossible for a whole universe to comprise only such material beings as would thus be free from corruption. Even if we maintained that such material beings could still be said to retain potentiality for other forms, that they were not intrinsically incorruptible but only "extrinsically" preserved from corruption (although this could be in virtue of qualities truly belonging to their own form), such a universe is certainly possible without contradiction to the fundamental nature of matter as we know it and as Aristotle and St. Thomas conceived it. Such a universe would not imply evolution. Simply because all the material beings of our experience seem subject to corruption and to evolution does not mean that it is self-contradictory for a material being, truly one, not to be subjected to corruption or to evolution. It is not the very nature of matter which is in question here but only the particular state in which it may exist or appear to exist.

We maintain, then, that theoretically it is possible for matter to exist in a state in which neither corruption nor evolution are necessarily implied, and that such a state would not imply a destruction of the nature of matter as we know it.[25] Aristotle and St. Thomas may have been *de facto* mistaken as to the particular kind of material beings to which they attributed freedom from corruption; they were not on that account necessarily mistaken as to the fact that matter could lend itself to such a possibility. And God could have directly created a uni-

state of existence without necessarily being supernatural in the sense of transcending the power of all created nature. This is not inconsistent with our understanding of the "incorruptibility" of prime matter referred to by St. Thomas, nor with principles comparable to those of the conservation of energy, and the like.

[25] We are not saying that this would necessarily be "static" matter or that change or activity of some sort would have to be eliminated from it. Change or "dynamism" can be retained without involving evolution or corruptibility. For St. Thomas the incorruptibility of the heavenly spheres was not considered incompatible with their movements.

verse of such beings all at once, eliminating evolution. Although they could still be subject to local motion, as we have said, mere local motion need not involve evolution. Once we concede that matter as such need not necessarily imply evolution, we can see that neither does change, nor secondary causality; for these could still truly exist even if we had only local motion. As for a hierarchy of living beings, this could certainly be the result of direct creation and as such does not necessarily imply evolution. Finally, diversity implies evolution least of all.

With this much said and these distinctions to aid us, we can now come more directly to our inquiry into the why of evolution. Since none of the factors just mentioned necessarily implies evolution, we know at least that whether or not they can give us the why of evolution, evolution cannot give us *their* why. Nothing can be the why of something more ultimate than itself, and these things taken as such are somehow more ultimate than evolution. They do not exist, then, that evolution might exist. They do not exist for the sake of evolution; evolution is not their end; it does not explain them. Simply because evolution is unable to give us their why, however, does not mean that a particular manifestation of matter or change or diversity could not in some respects and in certain instances be said to be ordered to a particular evolutionary manifestation or to the evolutionary process as a whole. It only means that neither matter, change, nor diversity, taken as a whole or in their totality, could be said to be ordered to the evolutionary process taken either partially or as a whole.

If these things do not exist for the sake of evolution, can we say that evolution exists for their sake? Are they the end of evolution? Evolution certainly does not exist for the sake of matter taken purely and simply, nor for the sake of changeability or change taken purely and simply, for both of these necessarily precede evolution in some way and are not necessarily any more truly themselves with or without evolution—which

is to say that evolution is not for *their* sake. Since evolution does not exist so that matter might be nor in order for change to be, these things taken as such cannot be said to be its end.

It is otherwise with diversity, what we have called community, and the order of acting secondary causes. Indeed, we cannot doubt that evolution as a whole is somehow ordered to diversity (just as it is to the universe considered as a totality) and also to community and to the order of secondary causes. It exists for their sake and they are ends for it.

Diversity, plurality or distinction can in a way be said to comprise the whole universe as such, both material and spiritual, so that the complete perfection of the universe in its entirety can in a sense be equated with its diversity, whether we take this as the diversity of entities or of their mutual relationships or both. This ultimate and " perfective " character of diversity in things-not-God is what led St. Thomas to stress the fact that there can be no primary cause to the diversity or distinction of things other than the direct intention of the Creator.[26] For what the Creator intends in creating is the whole creation as such and that means its completeness or perfection which is inseparable from its distinction or diversity.[27]

Does this mean that the ultimate why of evolution is diversity? Diversity is in a sense the ultimate end or why of evolution, but not its specific ultimate end—not any more than the universe taken as a whole can be said to be its specific end. Some students of evolution point out that in many cases evolution works against diversity and tends to reduce it. This could be relatively true in that certain differences may tend to become lesser differences, as is sometimes held with respect to the evolution of human teeth; but this cannot refer to diversity

[26] Cf. *Sum. cont. Gent.*, II, 39-45; *Summa Theol.*, I, 47, 1; *Comp. Theol.*, 72, 102.

[27] Cf. *Summa Theol.*, I, 3, 3 ad 2; I, 3, 7 ad 2; 47, 1 (also Cajetan's commentary); *Sum. cont. Gent.*, II, 45; III, 97.

or distinction purely and simply, for no two beings are perfectly alike, nor are any two parts or elements of any two beings or of the same being perfectly alike.

If this observation justifies our making any conclusion, it is that—whether or not we suppose a relatively simple initial evolutionary context—the overall result of a continued evolutionary process always tends towards an actual diversity greater than that present at the initial stage. We have no reason to believe that at any time in the past there were more actual species of living things, nor a greater number of individual living things than subsequently. If a given evolutionary process were disrupted or stopped by a decisive cataclysm of some sort such as the explosion of a star, the result could well be a relative simplification; but if evolution were to continue it would always involve an increase in diversity of some sort.[28] We maintain, then, that evolution always exists for the sake of diversity. As we have said, however, not only evolution but also matter and the community of matter are somehow for the sake of diversity or distinction. The proper or specific end of evolution must therefore be something besides diversity simply taken.

Our conclusion is that evolution has as its specific end a special community of matter in diversity and not the diversity itself. The ultimate why of evolution is to have oneness, continuity, ancestry, a continuum of similitude in changing material things ordered to diversity. Evolution insures this continuum directly, through matter, space and time, and it insures nothing else. In a sense this continuum of material community may even be said to be what evolution *is*,[29] what it signifies most profoundly; but it is also its why, its end.

[28] In this respect the findings of evolution seem to corroborate the statement of St. Thomas that material multitude has no certain limit, but tends of itself to infinity. Cf. *Summa Theol.*, I, 47, 3 ad 2.

[29] Evolution is the material community in the process of realization; but nothing hinders something of this community or at least something based on this community from remaining even after evolution has ceased.

Evolution exists directly for the sake of the continuum itself, that in whatever intended change or whatever intended diversity, materials things might preserve a certain kinship or similarity through a continuity as it were of ancestry or origin—an origin possibly traceable to a unique material form and to a unique act of origination. More simply, evolution exists that all material things might comprise one family in the deepest meaning of the term.

Absolutely speaking, this is neither accidental nor inevitable. It must be specifically intended as an end for evolution to fulfill; and it fulfills it unfailingly. Furthermore, this is the only thing that evolution taken as a whole has to fulfill unfailingly by its very nature. As we have seen, it is not without significance that whether they realized it or not, proponents of the evolutionary theory were led to its formulation not so much by the diversity of forms as by their similarity. Without necessarily implying anything about the purpose of evolution, all evolutionists conclude that the presence of evolution means at least that all or practically all living beings on earth are somehow related in the very true sense of being members of one "family." They see the unity of life not only as a unity of nature (including generic matter) or a unity of similar structures, functions, and activities, but also as a unity of common material ancestry. It is this last unity which really demands evolution. It is as a whole the most difficult unity to establish scientifically. Yet this is the precise unity for the sake of which evolution exists. Whether life began with one living form or several, in one or in different areas of the earth, would not alter the basic truth of the common origin of most living beings and their affinity to each other. In either case we have here a material community far more intimately associated than would be the case if we admitted separate creation for each species. It is in order to have this peculiar, more intimate material community that we have evolution.

Together with the fundamental purpose of material community, evolution has another end or purpose linked with but distinct from the first: secondary causality. Evolution exists that secondary causes related to each other or materially derived from each other might exist and exercise their own proportionate efficient causality. Evolution exists for the sake of a particular type of secondary causality as well as for the sake of community.

Community appears to be more basic than secondary causality, for community englobes the whole of evolution, whereas secondary causality seems to concern more the good of the individual secondary causes themselves. Strictly speaking, however, it is difficult to say that one commands the other. A continuum of material community without secondary efficient causes is certainly conceivable. In such a hypothetical community God would act directly on the pre-created matter, causing one form to succeed another without this being in any way due to the action of the material beings themselves which on this hypothesis would be purely passive at every level. Why God should want such a material community is no more difficult to answer than why He should want the community that actually exists. Both would still be ordered to diversity and would be explainable to some extent in relation to the same divine attribute.[30] We would have community but no true secondary material efficient causes. This would not have to preclude secondary causes of a spiritual nature, including the freedom of intelligent beings to determine their own spiritual acts. If such a community seems unbecoming because God would have to make every step

[30] The why of distinction or diversity and the why of the total community in which materially community is one element are ultimately found in the divine attribute of Beauty which, as the very order of parts in reference to the whole, is very closely linked with Wisdom. Beauty is the source of all distinctions and of all "harmonies," "friendships," "communions." Cf. *In De Div. Nom.*, IV, 5 and 6. A thorough treatment of this subject would undoubtedly be of incalculable value for any complete philosophical consideration of evolution.

Himself, we must remember that in any situation whatever and by the mere fact of giving them being, the First Cause is always more active in the action of secondary causes than those secondary causes themselves.

The only effective argument we find against such a community (a community which could still involve the very same hierarchy of material beings that we actually have) is that it would exclude from the universe true secondary material efficient causes. But this only means that secondary causes are a good in themselves quite irrespective of any material community, and that as such they must be intended for their own sake within the more universal good that constitutes the perfection of the universe. They are an end in themselves even though they are in some way further ordered to the more ultimate end of diversity. Material community, after all, is similarly further ordered to diversity. The continuum of material community and the order of secondary material causes are really co-ends of more or less the same degree of ultimacy as far as evolution is concerned. It is perhaps safer to say, then, that evolution is directly ordered to both and not primarily to one or the other.

We would arrive at the same result by working on the hypothesis of a universe where true secondary causes would exist without the existence of a community of matter of the type that actually exists, where we have as it were a sharing of the same matter in the initial ancestry. The whole hierarchy of material beings would then exist all at once, the product of immediate creation. We could even have material beings which come to be successively, but from *different* formed matter, yet the same *kind* of matter. One being could still move another, teach another, and so on, but there would be no true ancestry and no family. There would be no fathers teaching sons, no sons becoming fathers. There would be only movers and receivers of motion, only artists and their works of art, only

givers and receivers of knowledge or love: there would be no generations of plants, animals, men and their offspring. For this is possible only if we have a successive material community participating somehow in the *same* matter, and it requires at the same time true secondary causality. If we are to extend this community and this secondary causality beyond the limits of each individual species or type of living being—if this community involving secondary causality is intended to embrace more than just men, more than just this or that living form: an evolutionary process will have to take place. Evolution is needed for the sake of both the more intimate community and the secondary efficient causality of material beings. These are that for the sake of which it operates.

Our conclusion, then, is that evolution safeguards at once a certain maximum community of matter and the true efficient causality of secondary causes, and that this is its specific end. We call this the ultimate end of evolution (even though it can be further ordered to ulterior ends such as the diversity of general and individual forms ultimately required for the perfection of the universe) because it is the end of the process taken as a whole, the end it always fulfills in each and every manifestation. Given a context of matter, the evolutionary process thus exists essentially for the end of insuring this maximum unity in inter-causal material multiplicity and while doing this can be said to be instrumental in producing the maximum diversity born of what is most simple in form. As with every other reality in the universe the end of evolution is not achieved in just any manner but in conjunction with other ends. Thus, to the extent that the secondary causes within this family of matter are more perfectly causes, to that extent they are able to share more perfectly in both community and diversity, so that they constitute a hierarchy of living beings reflecting order in every disorder and the success of the beauty of the whole in each failure of the part.

V. Answers to Difficulties

Let us now return to the objections mentioned at the beginning of our discussion.

The first objection, that evolution is random, inconsistent, and so on, and therefore cannot have a purpose, is not a relevant objection to the finality of evolution itself once we see that the primary end of the universe, which goes beyond evolution, calls for diversity or distinction as such, regardless of what else may also be involved. If evolution sometimes leads to diversities which we cannot directly order to some hierarchy, or the like, this is not to say that it happens without purpose, for a diversity or distinction of forms is the purpose. Furthermore, if we are unable to discover the purpose of diversity,[31] this need not mean that we are therefore unable to discover the specific end of evolution. For this end is something other than diversity itself, being what we have referred to as the continuum of secondary causes and of material ancestry or community in changing things ordered to diversity. This very special community of matter will never cease to be realized so long as evolution continues.

The second objection, that the hierarchy in the material universe is apparently produced by chance so far as evolution is concerned, would be more difficult to answer were it not that the specific end of evolution taken as a whole is attained whether or not there is any *particular* hierarchy. This is not to say, of course, that the hierarchy resulting from this or that evolutionary phase is an accident and results only by chance. The hierarchy of living beings is perhaps the most extraordinary development associated with evolution and it can only be

[31] Diversity is the only way that the infinite perfection existing in unity in God can exist or be reflected in what is not God. Cf. *Summa Theol.*, I, 3, 3 ad 2; I, 47, 1; 47, 2 ad 3. The more perfect and the more rich the beauty to be reflected the greater the number of imperfect things and the greater the variety of imperfect things required to reflect it.

explained by an intelligent cause directing the evolutionary process in precisely that direction without, however, destroying the true causality of secondary causes. Nevertheless, absolutely speaking, evolution is not necessary for such a hierarchy, nor does the existence of evolution as a whole mean that we need to have this or that hierarchy. It is not essential to evolution that in the realization of the continuum this or that particular hierarchy should result. Why this or that hierarchy *does* result must be explained by something other than evolution if it is really to be explained and not simply to be meticulously and analytically observed.

Here we must to some extent disagree with Lecomte du Noüy[32] and others who maintain that the purpose of the inferior evolutionary lines is only for the sake of higher, more progressive lines, or that lesser species or individuals exist for the sake of the particular hierarchy that has resulted, that is, primarily man. According to this point of view all the apparent shortcomings of the countless individuals and species other than man, for example, would be explained by the ultimate good resulting from man's production, or the like. Evolution would thus have for its end precisely the establishment of this or that hierarchy, namely the one actually existing. While this cannot be completely discounted since evolution is undoubtedly instrumental in bringing about the existing hierarchy, it cannot be accepted as applying without qualification to the whole evolutionary process. The existing hierarchy taken alone or any particular hierarchy taken alone is not an adequate explanation for *all* the developments which have directly or indirectly led to these results, and no serious student of evolution can accept

[32] Cf. *Human Destiny* (New York, 1947), especially ch. 7 and 16. It is only fair to add that for him evolution seems to have a meaning which makes it indistinguishable from the *particular* hierarchical process culminating in the production of man. For him the lines not leading to man would thus be cut off as it were from evolution proper.

such an explanation as sufficient so long as he restricts his consideration of finality to the material universe.[33]

Our position is that evolution itself is ordered to an end which is more general than that of the given hierarchy of living material beings, so that this hierarchy itself could not be the specific end or raison d'être of evolution taken as a whole. Whether the hierarchy was ever complete or is complete now is not directly relevant to our problem. In fulfilling its specific end, evolution does serve the distinct and more particular end of being instrumental in bringing about the existing hierarchy, as well as the distinct and more universal end of diversity. But if what were intended were no more than a specific material hierarchy and not the continuum of ancestry of community as such with its concomitant secondary causality, there is no reason why such a hierarchy should not have been immediately created without evolution since hierarchy as such does not imply evolution. Indeed, with varying qualifications, the belief in an immediate creation of the hierarchy of living beings which prevailed in one way or another before the end of the last century, and which may never be completely abandoned, cannot be said to be unreasonable so long as there is no universally valid proof to the contrary. Evolution is simply not needed merely to serve the purposes of hierarchy, and the given material

[33] We might mention here that for St. Thomas the perfection of the universe was assumed to have consisted primarily in its diversity of species or classes, and these were more or less presumed to have been directly created by God as species. The universe is thus considered to have attained its primary perfection when it is complete as to the *kinds* of beings. This was assumed to have been reached with the production of the first man, with whom it could be said that the totality of the principal parts of the universe had been attained—as to species—even though countless individual human souls were yet to follow. Cf. *Sum. cont. Gent.*, II, 84; *Summa Theol.*, I, 91, 2. See, however, *Sum. Theol.*, I, 73, 1 ad 3, where it is admitted that new species can appear. Even if it should happen to be true in fact, it cannot be shown scientifically or philosophically that species yet to evolve would not constitute principal parts of the universe nor that the universe has reached completion even in this sense.

hierarchy cannot be taken as its specific end or raison d'être. An inability to discover the why of the peculiar nature of the given hierarchy is not, therefore, necessarily an obstacle to our discovery of the why of evolution.

The third objection, that all the individuals apparently intended by nature do not come to be, can be answered by showing that this only leaves unsolved the why of individual secondary or instrumental causes and not the why of evolution as a whole. The very diversity of these secondary causes, which is itself directly ordered to the perfection of the universe, makes it impossible for us to understand all of the cross-purposes and mutual influences that result.

Man's inability to fathom the complexities of secondary causes need not mean, however, that any particular effect or act resulting from this manifold would escape God's Providence. Every single being, relation, quality or act in the universe falls in some way and without destroying secondary causality directly under the divine causality and the divine intention.[34] This would include not only the fact of individual beings being what they are as individuals but also the fact of their particular degree of kinship with other individuals—which is what enables us to classify living things, for example, into everything from kingdoms and phylums to species and varieties. Not only, therefore, is the community of matter intended as involving matter; it is also intended as involving a particular community of form relative to the proximity of ancestry from the first form or forms. The *nature* of the form of any living organism cannot be explained by the material community itself but requires an intelligent architect able to intend this nature in addition to all the proximate material agents involved in bringing it about. In this sense every living form of a material composite, whether we call it a genus, species, variety or individual, is in-

[34] Cf. *Summa Theol.*, I, 19, 6 and 8; I, 22, 2 and 3.

tended as such and the matter disposed accordingly for its sake. And this, not in spite of but precisely through the intermediary of all the secondary causes involved. Neither matter as such nor the material community in general nor evolution can be said to exist for this or that particular form. But the organization and unity of this or that particular matter certainly exists in ordination to this or that particular form.[35] Why this particular individual does or does not come to be cannot be known or understood except by a complete knowledge and understanding of the totality of elements, factors, causes and relationships, as well as of the initial producing cause of that totality. Such knowledge usually transcends the capacities of man, although he can come to know a very great number of the things involved. From all this, however, we conclude simply that the precise why of certain individual things that occur in the universe escapes us. This does not in any way mean that the specific why of evolution in general need escape us. We can know the why of evolution without knowing the precise why of every product that it is instrumental in producing, just as we can know the why of an automobile without knowing the why of one having this or that particular shape. Whatever the interplay of secondary causes, the primary end of evolution remains unchanged and is always accomplished.

The fourth objection, involving the physical evil implied by evolution, unlike the others, hits directly at the very essence of evolution. The only answer to it is that the specific end of evolution entails a higher good than the apparent end of the

[35] If we hold that because of the undeniable contributions of secondary causes any product of evolution is only indirectly intended by God, we are saying that the unity in specific nature of each living being escapes the divine intention and results only by chance. Using a weak comparison, this would be like saying that in the Mona Lisa we could give direct credit to Leonardo da Vinci for choosing the size of the canvas and the number of original colors, but not for choosing the specific shades, nor for intending a woman, nor for intending that very woman named Mona Lisa. Cf. *op. cit.*, I, 19, 6, 8; I, 22, 1-4.

individuals involved in the process, so that only the sacrifice of the part can bring about the good and the very purpose of the whole. In other words, among earthly living things there *has* to be life and death if there is to be evolution in the sense of material community, and if there is to be true secondary causality in such a community. The life and death of particular material forms is ordered to the production of new forms, and the life and death of lower forms is more or less ordered to the higher forms. Higher forms of life can live only at the expense of other living things which, if not strictly speaking always lower, can for our purposes be taken to be so at least in general. To eliminate this from the evolutionary process would be to destroy the material community that evolution is specifically ordered to maintain and at the same time to destroy the possibility of a material hierarchy of living secondary causes resulting from such a community. For on the hypothesis that *all* material living beings be preserved from death, the matter from which they arise would necessarily have to be different—each material being would have his own unique matter and not matter that had been also that of other material beings: the material community would then be only a community of material *nature*, not a community of matter nor of material origin. But evolution intends a community which involves more or less participation in the *same* matter to the extent that this is possible, that is, for the most part successively. Thus the necessity for the continuum through time. Only in this way can the same matter X be shared successively by the individuals A, B, C, and so on. This is the material community which is the end of evolution and not a lesser type. And, so far as we can tell, the very nature of matter makes such an intimate community impossible without a succession of life and death to those participating. In spiritual beings this may be neither necessary nor possible, but in matter there can be no such community in diversity except a successive one, and there is

thus need of evolution for the sake of community. The drama of human existence lies precisely in the fact that man is both spirit and matter. Spirit demands simultaneous universal community. Matter can give only successive and evolutionary community and we do not know to what degree of universality it can attain. Hypothetically, in order to safeguard the community it is not absolutely necessary that men die. But *something* must die.

Our answer, then, is that the continuum of successive material community and the existence of acting secondary causes which constitute the specific ultimate why of evolution are as it were absolute goods which transcend the relative evils of the life-death cycle of living things, and that one cannot exist without the other. The evil of death so far as the end of evolution is concerned is no more evil than the burning of fuel in an airplane is evil to the function of the airplane. Either the fuel is sacrificed or the airplane itself is sacrificed. If ever the material universe ceases to involve death in any sense, destruction of any part for the sake of the whole, destruction of any form for the sake of other forms, destruction of old forms for the sake of new forms—at that moment evolution itself will have died. But so long as death exists, it exists for the sake of that community and causal relationship which is at the same time the very life of evolution.[36]

In conclusion let us add only that if our exploratory discussion into the why of evolution has led us or helped us to

[36] Although they are perhaps overquoted, we might recall here the closing lines of Darwin's *Origin of Species*: "Thus from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one: and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved."

discover something of its deeper significance, we do not presume because of this that the inexhaustible riddles of one of the most striking wonders of our universe have been solved. We only trust, however little it might be, that we have been led to penetrate deeper into its mystery.

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Manuscripts and Translations

The Rev. Dr. Paul Siwek, S. J., research professor at Fordham University, is preparing a new critical Greek text, with a Latin translation, of Aristotle's *On the Soul.* He hopes to complete the project within three years.

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Nature's Law: Competition or Cooperation?

by Sister Adrian Marie, O.P.

EVIDENCE of struggle in nature, of competition between organisms, of the fact that some animals and plants lived at the expense of others, was noted, of course, long before the time of Charles Darwin. The catch phrases "struggle for existence" and "survival of the fittest" together with his Malthusian "geometrical ratio of increase" were the keynotes of Darwin's theory. Although popularized through his writings and those of his contemporaries, Wallace, Huxley, and Spencer, these ideas can be found in the literature from ancient times. Empedocles was so aware of this aspect of nature that he proclaimed strife along with love or friendship as a principle of nature. That the animals most preyed on, such as the hare, produced their young in greater abundance, Herodotus thought worthy of note.[1] Aristotle devoted several chapters of his *History of Animals* to certain animals which war with one another and to others that are friends.[2] In a letter to Luculius,[3] Seneca pointed out that nature subjects the weak to the strong.

But it was not until after Darwin's five-year voyage on H. M. S. *Beagle*, during which he collected (and later published) such an amazing number of facts in substantiation of the theory of natural selection, that we find conflict in nature, rather than harmony or order, heralded by biologists as the more fundamental principle. Darwin thought of natural selection as nature's way of controlling the tremendous increase in the species of animals and plants by weeding out the less fit. The

[1] *The History of Herodotus*, Bk. 3, in *Great Books of the Western World*, ed. R. Hutchins (Chicago, 1952) VI, 112-113.

[2] 608b5-611a5; 611b30-612b5.

[3] *Seneca ad Lucilium Epistolae Morales*, transl. R. Gummere (New York, 1920) II, 397.

"survival of the fittest" in natural selection is, of course, a concomitant of the struggle for existence, as he saw it. Spencer did not hesitate to incorporate this theory into his iconoclastic works, from whence it filtered into social and political philosophy, giving us "Social Darwinism," the notion of human society itself evolving out of conflict. The seeds of Western individualism and of the Communist warfare of the classes were well planted in the soil of Cartesian mechanism and watered from the spring of the Darwinian struggle for existence.

We are assured by such contemporary biologists as Julian Huxley that "there are no signs that evolutionary biology will not indefinitely remain Darwinian." [4] However, as with many other generalizations about the physical world, e. g., Newtonian mechanics, Mendelian genetics, modifications have been increasingly necessary as the horizons of our knowledge of the facts have become enlarged. The modern evolutionary theory, according to Huxley, is in certain respects "more Darwinian than Darwin was himself." [5] It upholds the principle of natural selection as "omnipresent and virtually the only guiding agency in evolution," [6] and, of course, retains the idea of the prodigality of nature in reproducing the species of animals and plants; but the notion of struggle, by which overpopulation was supposedly controlled, has been considerably altered by an increasing number of biologists. Cooperation, rather than conflict, is nature's basic law, the principle on which natural selection operates, they tell us.

Biology books are still rolling off the press in the old "nature red in tooth and claw" style but they are much less in vogue now than they were a half century ago. Typical of this struggle-for-existence approach is Chandler's *Introduction to Parasitology*, now in its ninth edition.

[4] J. Huxley, "Darwinism Today," in *On Living in a Revolution* (New York, 1944) p. 103.

[5] *Ibid.*, p. 102. [6] *Ibid.*

One of the most appalling realizations with which every student of nature is brought face to face is the universal and unceasing struggle for existence which goes on during the life of every living organism, from the time of its conception until death. We like to think of nature's beauties, to admire her outward appearance of peacefulness, to set her up as an example for human emulation. Yet under her seeming calm there is going on everywhere in every pool, in every meadow, in every forest—murder, pillage, starvation, and suffering.[7]

Toynbee opened his book, *An Historian's Approach to Religion*, on the note that every creature in the universe is at war with every other creature and even with its Creator.[8] Such views of nature certainly have a Darwinian flavor, but they also bear out Huxley's claim that modern biological theory is in certain respects "more Darwinian than Darwin was himself."[9] In *The Origin of the Species*, for the most part, Darwin ignored nature's cooperative aspects, but he at least adverted to such mutually favorable adaptations as the bee to the flower from which it sips nectar, and vice versa.[10] The dependency of one organism upon another did not escape him, even though he thought this to be true of animals and plants remote in the scale of nature.[11] More than once he pointed out that natural selection works for the benefit of the individual concerned and does not produce anything exclusively for the good of another.[12] But perhaps Darwin was unconsciously sowing the seed for the present-day emphasis on nature's cooperative character, when he further stated that we are profoundly ignorant of the mutual relationships of all organic beings.[13] He could not have been totally unaware of the view of nature as an ordered whole, an

[7] A. Chandler (New York, 1955) p. 1.
[8] A. Toynbee (New York, 1956) p. 4.
[9] Huxley, *op. cit.*, p. 102.
[10] C. Darwin, *The Origin of the Species*, in *Great Books of the Western World*, ed. R. Hutchins (Chicago, 1952) XLIX, 46-47.
[11] *Ibid.*, p. 37.
[12] *Ibid.*, pp. 95, 98.
[13] *Ibid.*, pp. 7, 39, 62.

harmonious aggregate, when he said: "Let it also be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life." [14] In closing his chapter on "Struggle for Existence," he sounded a little more optimistic about nature than Chandler and Toynbee above:

> When we reflect on this struggle, we may console ourselves with the full belief, that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply.[15]

Representative of the new theme in contemporary biological thought is Marston Bates' book, *The Nature of Natural History*, one chapter of which is entitled, "Partnership and Cooperation." Bates stressed the interdependence of all organisms and claimed that we have gotten into a fallacious habit of seeing the organic world "as a mass of struggling, competing organisms, each trying to best the other for its place in the sun." [16] Such a principle, he warned, is only a superficial one that is superimposed on a more fundamental and essential mutual dependence. "The basic theme in nature is cooperation rather than competition—a cooperation that has become so all-pervasive, so completely integrated, that it is difficult to untwine and follow out the separate strands." [17] Perhaps he is right in suggesting that what science needs today is another Huxley to popularize the theory of cooperation in nature, as Thomas turned his literary genius to serve Darwin's idea of competition. Julian is as prolific a writer as was his grandfather, but his writings, at least on this point, do not seem to have such an influence on contemprary thought. Despite the fact that biologists are stressing nature's tendency to cooperation, rather than her competitive aspects, Bates regretfully noted that the

[14] *Ibid.*, p. 40.
[15] *Ibid.*, p. 39.
[16] (New York, 1950) p. 108.
[17] *Ibid.*

social philosophers have limited themselves to the view of the biological world envisioned by the post-Darwinians and Thomas Huxley.[18]

Let us go back a few years to catch a glimpse of the history of the development of this new theme of harmony and cooperation in nature. Of course it is not new at all, except to those whose education is limited to the outgrowth of the mechanistic eighteenth and nineteenth century evolutionary view of nature. We will begin by trying to discover why cooperation rather than struggle, as the basis for evolution, has gotten a hearing from the modern biologist.

At the close of the nineteenth century, Peter Kropotkin, a Russian prince, published a series of articles that were later collected and reprinted in a book entitled *Mutual Aid a Factor in Evolution.* These essays were provoked by the famous essay of T. H. Huxley, "The Struggle for Existence," which heralded the idea that "from the point of view of the moralist, the animal world is on about the same level as a gladiator's show."[19] Kropotkin, convinced that Huxley had given "a very incorrect representation of the facts of Nature, as one sees them in bush and in the forest," not only upheld the importance of mutual aid in the various classes of animals, but devoted more of these essays to "the importance of the same factor in the evolution of Man."[20]

Contemporary claims for the importance of Kropotkin's contribution to evolutionary thought may be found in the works of Ashley Montagu and the late Warder C. Allee. As the result of a lifetime devoted to the gathering of materials and experimentation, Allee, an ecologist at the University of Chicago, furnished sufficient evidence to satisfy many modern biologists

[18] *Ibid.*, p. 123.

[19] In appendix of *Mutual Aid,* by P. Kropotkin (Boston, 1955) pp. 329-341.

[20] *Ibid.*, pp. xiv-xv.

that the fundamental principle in nature is cooperation rather than competition. The extent of Allee's researches, writings, and his many publications over a period of more than 30 years, compares favorably, at least in quantity, with the voluminous writings of Charles Darwin. Montagu, a contemporary anthropologist, is at home in any of the problems relating man with man, or man with his environment. The bibliographies in two of his books, *On Being Human* and *Darwin Competition & Cooperation,* indicate extensive research into the literature of cooperative action in nature. Doubtless the social and political climate is not so well suited to the development of Allee's and Montagu's ideas as was that of the nineteenth century to Darwin's. The 1250 copies of the first edition of *The Origin of the Species* sold out on the day of publication.

In an historical approach to this question in his book *Cooperation Among Animals,* Allee went back farther than the writings of Kropotkin. A French publication, *Des Sociétés Animales* by A. V. Espinas, published in 1878, used the behavioristic and ecological approach which Allee himself adopted. Espinas, like Allee, claimed that social life among organisms was not an accident in the animal kingdom, arising fortuitously and capriciously among a few related groups as the beavers, bees and ants. Espinas thought himself in a position to prove that communal life among living creatures was a biological necessity, a universal fact of nature. For Espinas, nature is a homogeneous whole, integrated in all its parts. This integration results from a universal law of cooperation.[21]

William Morton Wheeler, a distinguished American entomologist, furnished Allee with what a materialistic age would categorize as an even more fundamental basis for this law of harmony. "All living things," Wheeler said, "are genetically related as members of one great family, one vast living sum-

[21] From quotation in *Animal Aggregations,* by W. Allee (Chicago, 1931) pp. 352-353.

plasm, which though fragmented into individuals in space, is nevertheless absolutely continuous in time." [22] In fact Allee pushed his analysis back from "unconscious cooperation" or mutual dependence of living things, to a "simpler interdependence of antecedent non-living matter." [23] According to his view, nature's harmonious working may be merely the highly specialized biological expression of chemistry's law of mass action.[24] This principle of nature for Allee was not just the result of a family relationship or the fact that two sexes are so commonly needed for cooperation in reproducing the species. The evolution of close knit societies of animals most likely did arise from such relationship, he thought; but it came about more readily because of the "existence of an underlying pervasive element of unconscious proto-cooperation, or automatic tendency toward mutual aid among animals." [25]

Allee did innumerable experiments to demonstrate this automatic cooperative tendency among animals. He found among groups of goldfish a higher tolerance for collodial silver than single fish had, when exposed to the same concentration of this toxic substance. An aggregation of planaria in ultraviolet light disintegrated less rapidly than isolated specimens did. Dilute suspensions of sperm of Arbacia, the common sea urchin, lost their fertilizing power much more readily than concentrated suspensions. More crowded cultures of Arbacia larva were more precocious in their development than were sparser populations.[26] From further laboratory experiments with goldfish, Allee thought he had demonstrated a device of nature by which more aggressive fish would regurgitate enough food to be of real nutritional value to their less fortunate comrades. This, he concluded, was a sort of automatic sharing.[27] Another significant fact, he pointed out, is the inability of some species when reduced below

[22] *Ibid.* [23] *Ibid.*, p. 355. [24] *Ibid.*
[25] Allee, *Cooperation Among Animals* (New York, 1951) p. 29.
[26] *Ibid.*, p. 49. [27] *Ibid.*, pp. 63-68.

a certain threshold number to reestablish themselves. The heath hen was last seen in 1932 even though it had been protected by law and by enthusiastic nature lovers since 1907. At that time there were an estimated seventy-seven but this number increased to 2,000 by 1916. Nevertheless the heath hen became extinct.[28] Even behavioral studies furnished evidence of the effects of numbers. Allee did not claim increased survival in all cases for increasing numbers, but warned us of the fallacy of deciding there is no such value because it is not evident.[29]

Allee acknowledged that the harmful effects of large aggregations of nonsocial animals [30] was experimentally established in the 1850's by the work of Hogg on water snails,[31] but he saw the many exceptions to Hogg's conclusion as evidence of another principle at work. The large aggregations of nonsocial species of animals at breeding time, during migrations and hibernations, are the most notable exceptions. Aside from such obviously mutually beneficial aggregations, he cited numerous other examples, such as the layer of euglena causing the green "bloom" over many stagnant ponds,[32] the colonial forms of various invertebrates,[33] overnight aggregations of certain insects collecting around lights and sleeping together,[34] stag parties of Scottish deer.[35] Although such aggregations may not always be to the best interests of the animal, yet in the long run, he pointed out, animal behavior must be beneficial or the species would be exterminated.[36] Allee thought that evolution, and perhaps the development of sex, resulted from the beneficial aspects of aggregations.[37]

[28] *Ibid.*, pp. 79-82.
[29] *Ibid.*, p. 17.
[30] The term "nonsocial" is used in referring to animals that do not live specialized community lives as do bees, ants, and termites. Biologists refer to the latter as "social" animals. Cf. Allee, *ibid.*, p. 154.
[31] *Ibid.*, p. 63.
[32] *Ibid.*, p. 18
[33] *Ibid.*, p. 24
[34] *Ibid.*, p. 27.
[35] *Ibid.*, p. 29.
[36] *Ibid.*, p. 17.
[37] *Ibid.*, pp. 11, 57, 211.

From a wide variety of animal phyla, Allee certainly collected an impressive amount of evidence for his theme for a world of order, mutual aid, and harmony, which he would extend also into the world of man. He thought this automatic cooperation sufficiently widespread among animals to warrant its adoption as a fundamental property of animal protoplasm, and probably of all protoplasm.[38] The acceptance of this biological principle in social theory, and as a basis for human behavior, he prophesied, would chart a new course in human history.[39]

In his book, *On Being Human*, Montagu attempted to reconcile positions as diverse as the rank materialism of our scientific age, which reduces man to pi mesons and neutrinos with the rest of matter,[40] and the ineffable idealism of that love given us by Christ Himself which can transform and transfigure man into a creature, somehow divine.[41] As Darwin, in proclaiming nature's struggle-for-existence law, had supplied a scientific basis for the social and political theory of his time, so Montagu now envisions biology as underwriting Christ's doctrine of love for one's neighbor. Montagu did not discount materialistic evolution, but thought it bore more valid testimony to an opposite law of love, rather than to Darwin's theory of struggle and strife. Nature tells us not to compete, he reechoed from Kropotkin's *Mutual Aid*:[42]

> Today, contrary to the 'nature, red in tooth and claw' school of natural selectionists, the evidence does not act principally to favor variations which through a ruthless kind of competition better adjust the organism to its environment. Adjustment is, of course, necessary, but the important point is that natural selection favors the co-operative, as

[38] Allee, *Animal Aggregations*, p. 356.
[39] Allee, *Cooperation Among Animals*, p. 213.
[40] A. Montagu, *On Being Human* (New York, 1951) pp. 73, 76.
[41] *Ibid.*, p. 109.
[42] A. Montagu, *Darwin, Competition and Cooperation* (New York, 1952) p. 41.

opposed to the disoperative, struggle for life. To 'struggle for life' is to be co-operative, for life is of its nature social and all activities calculated to maintain it in the individual and in the species are co-operative.[43]

Insofar as man is concerned, competition has no adaptive value in the modern world, he stated.[44] That "man is born for co-operation, not for competition and conflict . . . is a basic discovery of modern science." [45] The sense of mutuality and cooperativeness may be suppressed, but it will eventually assert itself again, for it is of the essence of man's protoplasm, Montagu insisted.[46] "Man can retain his health and flourish only in love of, and co-operation with, his fellow man." [47] He attributed many of the evils of our Western world, such as mental disorders, fears, anxiety and insecurity, to man's competitive attitude toward his fellowman. The basic need of mankind is security, which love alone can satisfy. In fact, he identified love with security.[48] Such a love which is fundamentally a property of protoplasm [49] and develops under the aegis of the organism's "ever-present urge to feel secure," [50] lacks, of course, the transforming properties of the theological virtue of charity. But for one who knows that grace perfects nature, even a naturally enriched substrate for charity, a scientific promise for a world whose hope rests in science, is "good news."

Both Allee and Montagu gave extensive references in verification of this principle of harmony in nature. However neither of them attempted such a universal substantiation of their views as did Spencer in establishing his principles of nature. Whereas Allee laid his foundation primarily in protoplasm, in which he found an inherent automatic cooperation, an unconscious kind of mutualism,[51] and Montagu suggested

[43] *Ibid.*, p. 70.
[44] *Ibid.*, p. 72.
[45] Montagu, *On Being Human*, p. 109.
[46] *Ibid.*, p. 101.
[47] *Ibid.*, p. 115.
[48] *Ibid.*, p. 98.
[49] *Ibid.*, p. 101.
[50] *Ibid.*, p. 98.
[51] Allee, *Animal Aggregations*, p. 355.

that the fundamental social nature of all things stems from the physiological relationship between parent and offspring,[52] Spencer dug deeply into the inanimate and found his universal principle in evidence at the level of the mineral, the inanimate.[53] If the principle which is to stand is the one that can best be substantiated from the facts of nature, it seems necessary to call to the witness stand any related fields that can give testimony.

Our concepts of the material universe as explained by the contemporary chemist and physicist are based on statistical laws throughout. Probability and laws of chance applied to statistical aggregates, account for the rate of disintegration of uranium and of the pressure of a gas in its container. The action or nature of one atom of uranium cannot be known, but laws for the disintegration of large aggregates of such atoms can be established. Such order arises from the very tendency of large aggregates to randomness—our faith in which, has been established by law, the second law of thermodynamics, entropy. Biologists quickly fell in line, marching to the same tune. Today geneticists tell us of a comparable randomness among genetic entities. Only large numbers of genes, statistical aggregates, provide foundation blocks for Mendelian genetics. Simpson pointed out that "the shuffling of existing stocks of genes in sexual reproduction is, in the main, random."[54] Evolution is an interplay between "the largely random operation of the whole mechanism of heredity," and the orienting effect of adaptation.[55]

Does this basic arbitrariness, randomness in nature, which physics and chemistry report to us indicate a lack of order, a sort of chaos as the bedrock of our material universe? Perhaps

[52] Montagu, *On Being Human*, p. 29.
[53] H. Spencer, *First Principles* (New York, 1958) pp. 571-573.
[54] G. Simpson, *The Meaning of Evolution* (New Haven, 1949) p. 218.
[55] *Ibid.*, p. 219.

such "laws" are really only an acknowledgement of our ignorance. At least at the time that he wrote *The Origin of the Species,* Darwin thought so:

> I have hitherto sometimes spoken as if the variations—so common and multiform with organic beings under domestication, and in a lesser degree with those under nature—were due to chance. This, of course, is a wholly incorrect expression, but it serves to acknowledge plainly our ignorance of the cause of each particular variation.[56]

In *Creative Evolution,* Bergson pointed out that the appearance of chance, disorder, randomness in nature, is only a negative finding disguised in a positive expression. Because one does not find the order in nature which one expected (which is only one out of a number of possible orders which nature could display for an inquiring mind) nature is said to be based on disorder or randomness.[57]

Is this so-called disorder, randomness in nature, which becomes intelligible for many today only in the light of laws of chance, somehow akin to Darwin's principle of struggle, to Empedocles' principle of strife? The modern biologist supports the idea of mutual aid, of cooperation in the biotic world, but sees no contradiction in stating that this order stems from chance, from randomness. There seem to be only two ways of explaining the world, either it arose out of design or from chance. If we admit it is a product of design, of a Divine Creator, then a basic principle of harmony in nature, its fundamental tendency to order, would be a sign of His handiwork. If the apparent order in nature, which none can deny, has come to be by chance, if man himself is only a fortuitous accident, could strife and struggle be nature's foundation stones? Darwin's idea of struggle has not been without supporters among sociologists, economists, biologists, philosophers and even would-be theologians. Allee and Montagu, representing biology and

[56] *Ibid.*, p. 95.

[57] H. Bergson, transl. A. Mitchell (New York, 1911) p. 222.

anthropology, found spokesmen from as many fields represented among the advocates of cooperation.[58] Which yields a more fruitful approach to nature, a truer conception of the real world?

Simpson, a geneticist, rejected the Darwinian concept of struggle, which he thought to be a cause of serious misunderstanding of the work of natural selection,[59] but he regarded this process of selection as a blind force, not as an harmonious principle established by design.[60] We become suspicious of Simpson's tenets when we examine some of his conclusions. Seemingly this is another case of a little error in the beginning becoming a big error in the conclusion.

> It has also been shown that purpose and plan are not characteristic of organic evolution and are not a key to any of its operations. . . .
>
> Man was certainly not the goal of evolution which evidently had no goal. He was not planned, in an operation wholly planless.[61]

Or let us listen to the creed of another contemporary biologist:

> Most basically, natural selection converts accident into apparent design, randomness into organized pattern. Mutation merely provides the raw material of evolution; it is a random affair, and takes place in all directions.[62]

There is a clue to the Christian when he reads the blasphemous conclusions with regard to God that some modern biologists are making,[63] that either their principles are wrong or their logic is faulty. However, it may be confusing to see men use the same principle as evidence in support of, or against, religious

[58] Cf. the bibliographies and reading lists in their works cited.
[59] *The Meaning of Evolution*, p. 221.
[60] *Ibid.*, p. 230.
[61] *Ibid.*, p. 292.
[62] J. Huxley, *Evolution in Action* (New York, 1953) p. 38.
[63] J. Huxley, "Religion as an Objective Problem," in *Man Stands Alone* (New York, 1941) pp. 276-279; J. B. S. Haldane, *Daedalus* (New York, 1924) pp. 91-93.

beliefs and a moral code. Montagu claimed a confirmation of religious truths in his principle of love in nature.[64] Allee was ready to drop anything that hinted of not submitting to the slightest whim of modern science. In his book, *Cooperation Among Animals*, he suggested in an off-hand way that most of the genetic ill effects of a population badly shattered by war could be prevented, if monogamy were "less of an ingrained human practice."[65]

Is there no way out of the dilemma? It is plainly evident that there is competition for life going on in nature. When we sit down to table we are enjoying nourishment at the expense of other forms of life. Yet when we behold with Shelley "nature's unchanging harmony,"[66] we are convinced with Tennyson that "the whole wood-world is one full peal of praise."[67] Here is order, here is harmony, here is peace, here is God. The scientist stands back in awe and lets the poet speak:

> Flower in the crannied wall,
> I pluck you out of the crannies,
> I hold you here, root and all, in my hand,
> Little flower—but *if* I could understand
> What you are, root and all, and all in all,
> I should know what God and man is.[68]

But is no one qualified to speak out with certitude in favor of one principle as being the more fundamental? Must we despair of arriving at the truth through human reason? Is Allee correct in thinking that metaphysics as a unifying discipline is powerless today,[69] especially as it appears on the stage

[64] Montagu, *On Being Human*, p. 109.

[65] Allee, *Cooperation Among Animals*, p. 191.

[66] P. Shelley, "Queen Mab," in *The Poetical Works of Percy Bysshe Shelley*, ed. E. Dowden (New York, n. d.) p. 33.

[67] A. Tennyson, "Balin and Balan," in *The Poetic and Dramatic Works of Alfred Lord Tennyson* (New York, 1898) p. 364.

[68] *Ibid.*, p. 274.

[69] Allee, *Cooperation among Animals*, pp. 3-4.

as a subordinate character to modern science which certainly has the lead? Perhaps the following, from Whitehead's *Science and the Modern World*, may give us a valuable clue:

> The men of the Middle Ages were in pursuit of an excellency of which we have nearly forgotten the existence. They set before themselves the ideal of the attainment of a harmony of the understanding. We are contents with superficial ordering from diverse arbitrary starting points.[70]

Whence did the men of the Middle Ages acquire a hope of such an excellent type of knowledge, whereby truth could be harmonized and ordered, so that some truths could be established and held with certainty, others with more or less probability? They did not have to wait to see how many facts from sensible experience future generations could muster, to get their starting points. They eagerly welcomed all the facts nature reluctantly yields to questing minds to give the correct overtones and amplifications to the principles which through their reason they understood, accepted and defended.[71]

Metaphysics served as a handmaid to their theology, it also served as the directive and regulative human science, the guardian of the principles of all less noble sciences—the study of nature, mathematics and moral science. In defending the principles of the other sciences in the light of their highest causes, metaphysics is at once a science and a wisdom. As a science, it provides certain conclusions; as a wisdom, it puts order in all knowledge. What was the origin of such a rational system? Like so much in Western thought it came from the fruitful period of Greek thought when man had confidence in his power to reason. In the mind of a great scientific genius, Aristotle, the Greeks brought forth a whole schema of human learning and established the order and relationship of all the

[70] A. Whitehead (New York, 1954) pp. 110-111. With permission of publisher.

[71] Cf. Thomas Aquinas in *Phys.*, I and II.

natural disciplines. In book three, chapter four, of his *Metaphysics,* Aristotle pointed out the mistake that Empedocles made in making strife a principle and a cause. How many blind alleys modern science might have avoided if metaphysics had continued to light up its way. Then came the thirteenth century. It captured the crown from the Greeks when it brought forth its great intellectual light, Thomas Aquinas, and through him brought theology into this beautiful synthesis as its queen.

Without this synthesis, at least without metaphysics, we have no regulative science, no guide through human reason, no criteria for accepting one explanation in favor of another. Rather, we then have to depend on the larger and more compelling number of experiments performed, in the hope that nature will thereby confirm some particular principle. Wisdom becomes only an empty dream with which not even a poet would want to consort. In *Cooperation Among Animals,* Allee pointed out that there is at least one major attempt being made today to unify all knowledge around metaphysics. He concluded: "Such efforts, while furnishing an excellent corrective for overconfident scientists, seem mischievously naïve as a serious, present-day movement." [72] But if such naïvete can get us out of our present dilemma, then let us be naïve. By what standard did Toynbee decide that all creatures are at war with all other creatures and even with their Creator? If we can during our life count more experiences in favor of Darwin's struggle, shall we take his starting point? Or, if we can muster more actual cases on the side of cooperation, will we then side with Allee and Montagu? Should we wait until the end of our lives to get our starting point, or shall we continue to be satisfied with "diverse arbitrary starting points?"

In 1948, Schrödinger delivered a series of lectures at Uni-

[72] P. 3.

versity College, London, on "Nature and the Greeks."[73] He proposed and developed the idea that a return to ancient thought would be productive of greater fertility for science and philosophy. Had the Greeks' "highly flexible and open-minded spirit" been retained with the fruits of their thought, many supposed laws of modern science would have been pruned of error sooner.[74] In fact, the modern crisis in theoretical physics, with Newton's absolute space and time yielding to relativity, and the latter with quantum mechanics perhaps yielding to Heisenberg's new field theory, has shown the necessity of re-examining the foundation stones of modern physical theory[75] Bates indicated a similar need in biology:

> We still, I think, have managed little improvement on Darwin's theory. The woods are full of neo-Darwinians, anti-Darwinians, Lamarckians, Bergosonians, orthogenicists, and goodness knows what else, all with theories to sell, mostly wrapped in almost impenetrable layers of verbiage. The core, when finally arrived at, usually looks to me like metaphysics—an *élan vital*, an innate tendency of some kind beyond the reach of the experimental method. Such theories then belong to the province of the philosophers, and ought to be examined there.[76]

In the spirit of Schrödinger's and Bates' suggestions, let us ask Aristotle what nature's fundamental working principle is. Is it order, harmony, cooperation based on design, or struggle, strife, competition, based on pure chance? Aristotle did not wait for biology to settle this principle of nature, but found the answer in the more general natural science, physics. In the second book of his *Physics*, he asked nature whether her operations are from design or by chance. Again, does nature operate for the sake of something or just from necessity? Does it rain

[73] E. Schrödinger, reprinted in part in *What is Life? and Other Scientific Essays* (New York, 1956) pp. 89-109.

[74] *Ibid.*, p. 100.

[75] *Ibid.*, pp. 100-101; cf. foreword by L. de Broglie in *Causality and Chance in Modern Physics*, by D. Bohm (New York, 1957) pp. ix-xi.

[76] Bates, *The Nature of Natural History*, p. 236.

to make corn grow or just from the necessity of the water vapor which has condensed and has become a burden to the sky? Are teeth differentiated into incisors, canines, molars from a necessity of nature or in order to perform diverse functions better, as cutting, tearing and chewing?

Aristotle thought it impossible to think of nature acting only because of chance or from the necessity of matter. Things are not said to be by chance when they happen regularly. If we touch a hot stove we do not say that it is by chance we were burned, or that it is by chance that a chicken hatches from a chicken egg. Obviously what happens regularly, or for the most part, is not by chance. But that which we say is from nature happens regularly or for the most part, and therefore is not by chance.

When a series has an end or completion, all the steps in the series are for the end. When an artist paints a picture, all the steps are for the end: the landscape to be portrayed. In the same way the steps nature takes are for a determinate end and so are ordered to it. The bird constructs its nest in a certain way, characteristic of the species, in order to hold and to protect the eggs and the young birds. Leaves on a tree are arranged to give maximum surface exposure for absorption of sunlight and also to protect the fruit. Water seeks its own level and thus provides innumerable benefits for all organic life. The fact that nature does not deliberate presented no problem to Aristotle. Neither does art deliberate; if it did, the wood could make itself into a bed. Just as intelligent action is for an end, so nature is for an end. To say nature acts haphazardly because we cannot see the deliberation in the Mind of a Divine Artist, is like saying that an arrow is not directed to the target by the mind of the archer, but only by a necessity of his hormones, sinews, arms, fingers, the bow, the medium through which it travels and so on.

After establishing dialectically the opinion that nature

operates for an end,[77] Aristotle used it in all his subsequent investigations of the natural world—his chemistry, astronomy, psychology and biology. He then scrutinized it from the heights of metaphysics.[78] He found no fundamental inconsistency, so for him this is an established and sure starting point for further advance in knowledge of the physical world.

St. Thomas did not stop at Aristotle's elevation of natural wisdom. Trained rigorously in the disciplines of the ancients, under the shadow of divine revelation, he was able to use, to clarify, often to correct and amplify, if need be, the principles, and certainly the development, of Aristotle's natural wisdom—that it might be transformed and touch on the divine. He regarded the whole rhythm and movement of the universe, down to its tiniest atom as in the all-true and pure light of the Trinity. He considered all things in the order and the harmony with which they proceed from God.

As he commented on the *Physics*, St. Thomas reasoned with Aristotle that nature works for an end. In the *Summa* many times he observed that things tend more to the common good than to their own individual good.[79] St. Thomas used another argument from Aristotle when he pointed out that the good of the universe is related to it in much the same way good is in an army.[80] The good of the universe is in the universe as something separate and in the order of its parts, as the good of an army is both in the order of its parts and in its leader, but more in the leader, for the order is dependent on him, and not vice versa. Aristotle had already pointed out that all things in the universe are somehow ordered—" fishes, and fowls and plants." [81] Therefore, said St. Thomas, the order of the uni-

[77] II *Phys.*, 8, 198b10-199b33.
[78] *Meta.*, L, 10.
[79] *Summa Theol.*, II-II, 26, 3; II-II, 26, 4 ad 3; I-II, 109, 3.
[80] *Summa Theol.*, I, 15, 2.
[81] *Meta., loc. cit.*

verse must have been properly intended by God and is not the result of a succession of agents, as some thought. If the order of the whole depended on Him, then He must have an idea of each of the parts, as a builder could not conceive the whole building without having an idea of each of its parts.[82]

Modern science would readily yield testimony in favor of this intellectually satisfying approach to our problem. Never before have we been so aware of the delicate balance of materials and forces here on earth as we are at present. As man contemplates rocketing into the hostile environment of outer space, he is making very careful examinations of his "womb-like utopia" [83]—the earth.

If man is able to take Laika's place in a Sputnik or any other space ship, he must capture a small bit of mother earth and take her with him. Again art must imitate nature, for man must build his little earth, his artificial external environment, so as to reproduce and maintain a close approximation to the conditions found on earth. His foods must conform to the standards set by nature when she produces carbohydrates, fats and proteins for man, and enriches them with minerals and vitamins. He must have the bulk mother earth provides, for, according to rocket expert, Willy Ley, a meal in a pill will not work.[84]

Man will have trouble pulling himself and his little earth away from his natural home. A space man weighing 180 lbs. on earth will weigh over half a ton during take-off into space. Normally man is accustomed to the gravitation stress of one g at sea level. At 7 g his blood becomes like liquid iron.[85] In launching a rocket, peaks up to 9 g may be experienced.[86]

[82] *Summa Theol.*, I, 15, 2.
[83] C. Adams, *Space Flight* (New York, 1958) p. 237.
[84] *Rockets and Space Travel* (New York, 1947) p. 307.
[85] Adams, *Space Flight*, p. 251.
[86] *Ibid.*, p. 259.

Then as the speed in the space ship counterbalances the so-called pull of gravity, our space man must adjust to the ordeal of weightlessness. Dr. Siegfried J. Gerathewohl of the Army Ballistic Missile Agency at Redstone Arsenal, Alabama, has investigated the digestive difficulties to be faced. About one-third of those subjected to virtual weightless conditions, he found, suffered from minor to severe gastro-intestinal complaints.[87] The psychological effects of weightlessness on man may indeed be even more drastic. In fact, Colonel J. P. Henry predicted that a space flier might suffer a mental breakdown after only a few hours of weightlessness, if proper stimuli were not provided.[88]

All in all the new field of space medicine makes us more aware that man is "at home" on earth for a great variety of reasons. As man takes the center of the evolutionary stage, the evidence for an Antichance Cause becomes ever more compelling. If man is the end or goal of nature, man's existence on this earth sheds light on the whole unfolding of the universe during the ages it was being prepared for his advent. To decide arbitrarily that chance, or competition based on chance, can explain this mysterious universe is one approach, but one that can scarcely satisfy open minds that have not been dulled by the biased answers cluttering the minds of many of our modern scientists. Here, obviously, is a case of carefully laid and executed plans which blueprinted a fitting home for man, the lord of creation. It seems equally obvious that only the most detailed cooperative efforts on the part of man will permit him to extend his dominion into the realms of space. Cooperation, not competition, is the price of survival.

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[87] "Weightlessness" in *Air University Quarterly Review*, X (1958) 135.
[88] Adams, *Space Flight*, p. 259.

The Secretary's Notes

Thirty-Fourth Annual Meeting

EXCEPT FOR a few details, all the final arrangements are now complete for the next Annual Meeting of the American Catholic Philosophical Association on April 19 and 20, 1960, at the Coronado Hotel in St. Louis, Missouri. Members of the Association will be able to get the complete program of the meeting through a direct communication from the secretary, or in the next issue of The New Scholasticism.

The secretary wishes to express his gratitude to the chairmen of the sectional meetings for their programs and fine cooperation.

Official Business

By this time, or soon, the members should have received copies of the *Proceedings* of the thirty-third Annual Meeting.

The secretary wishes to remind the members that, even though the academic year has begun, this office has several applicants for teaching positions, and in case certain necessities arise, any university or college can get in touch with this office.

The members are reminded again that, if members have any suggestions about the manner of the selection of the locality of the conventions or change of format of the meetings, would they please send in their suggestions to either Rev. Dr. George P. Klubertanz, S. J., Dr. Vernon J. Bourke, or Dr. James D. Collins, all of whom are located at St. Louis University, St. Louis, Missouri.

Sectional Meetings

The New York Metropolitan Round Table held its final meeting of the year at Manhattan College on May 10. Mother Mary T. Clark, R. S. C. J., of the faculty of Manhattan College of the Sacred Heart led the discussion which was concerned with her book on *St. Augustine and Freedom*. At the conclusion of the meeting, Mother Clark was elected chairman for the scholastic year 1959-1960.

MISCELLANEOUS

The department of philosophy of Marquette University, Milwaukee, Wisconsin, conducted its third biennial Philosophical Institute in the Teaching of Philosophy in a four day session from June 15 through June 18. Participants of the Institute addressed themselves to the topic of demonstration and its realization in the several philosophical disciplines in the expectation that the nature and employment of demonstration would make for increased effectiveness in their teaching of philosophy. One paper was delivered each day by a speaker who served as that day's discussion leader. Small group discussions on the topic of the day followed the paper and were themselves followed by a general discussion of the same topic. Rev. William Baumgaertner of the St. Paul Seminary spoke on "Demonstration from the Point of View of the Logician." Dr. Francis Collingwood of Marquette University spoke on "Demonstration in the Philosophy of Nature." Dr. James Anderson of Villanova University delivered a paper on "Demonstration in Metaphysics." Rev. William Dooley, S. J., of Marquette University, spoke on "Demonstration in Moral Philosophy." Over fifty philosophy teachers participated in the Institute, representing twenty-four schools from thirteen states and one Canadian province. The Institute was under the direction of Dr. Edward Simmons, assisted by Mr. James Murphy, both of Marquette University.

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National Secretary

Catholic University of America,
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Book Reviews

Petrus Abaelerdus, Dialectica. **Edited by L. M. De Ryk. Assen, Netherlands: Van Gorcum and Co., 1956. Distributing Agent: New York: Gregory Lounz. Pp. xciv + 51-598, with indices. $13.50.**

This is the first complete edition ever published of the major work on logic of the author whom we are usually accustomed to refer to as Peter Abelard, but to whom the editor consistently refers as Peter Abailard in his Introduction, written in English, and as Petrus Abaelerdus in the title page and the cover of the book.

The text is taken from a manuscript owned by the priory of St. Victor until the French Revolution when it passed into the possession of the French nation which now houses it in the Bibliothèque Nationale, under the description Ms. Lat. 14.614. Victor Cousin had previously published part of this text in the nineteenth century.

In this extensive Introduction the editor gives an interesting analysis of the work. He points out that the opening pages are missing, and that they are probably lost forever since they would seem to have contained an attack on William of Champeaux, the founder of the Priory of St. Victor. "Nevertheless, I commence the text on p. 51 in case some one should be fortunate enough to find it" (p. xiii, note 3).

The principal sources of this work are the commentaries and other works based on the logic of Boethius. The editor discusses at length various versions of the text supposed to be that of Boethius. In general he seems to hold that Abelard had access to an authentic version of the works of Boethius and that the standard version found in Migne, for instance, is not the work of Boethius at all, but is that of an "anonymous author, living probably in the ninth century" (p. xiv). He thinks the authentic text exists at present only in "a few manuscripts" (p. xiv). This question is discussed at length (pp. xiii-xvi).

De Ryk also thinks that Abelard had some knowledge of the later part of Aristotle's *Organon*, which was introduced about the time of Abelard, and came to be known to later generations as the *logica nova*.

He also presents evidence that Abelard was in the habit of revising his work after completion of its various parts, and that the version we have represents a third revision published between 1135-1137, and represents a reworking done at Cluny in his final years.

In his analysis of the contents of the work De Ryk also draws extensively on the other logical works of Abelard, especially a work called *Logica Ingredientibus*. This enables him to reconstitute a sketch of the missing parts, and to point out successive stages in the development of Abelard's own ideas on important questions, like the nature and role of the copula (p. xxxiii).

Abelard understands "*logica* or *dialectica* as the art which aims at distinguishing valid arguments from invalid ones" (p. xxiii). This statement is based on a passage in an earlier work where Abelard is saying that logic does not contruct arguments, but that its task is rather to judge truly among them to see which ones are strong and which ones are weak. It is impossible, however, to construe this as meaning that he holds logic to be a discipline that does not also have considerations based on the meaning of what is being discussed. He clearly distinguishes between arguments whose conclusive force rests on the pure form of reasoning (ipsa complexa terminorum) and those where "the matter of the arguments contributes to its conclusiveness" (p. xxiv). The rules that help us find and judge these latter are those concerning topical arguments.

It is possible to reconstitute the missing parts of the *Dialectica* from a remark made in the epilogue of the work to Abelard's brother, Dagobert (for the instruction of whose son the book seems to have been written). The opening part of the work would then be a treatment of Porphyry's *Predicables*, followed by a treatise on first and second substance. Since this is the locus of the great controversy over nominalism and realism in which Abelard and his arch enemy, William of Champeaux, were so heavily engaged it is understandable that this part of the work would not survive in an abbey whose founder was none other than William himself.

The treatise as we have it begins with the end of this first chapter of the second volume and continues with a further treatment of substance and then of the other categories. Next there is a section called *Postpraedicamenta*, which, despite its name, corresponds not to the last chapters of Aristotle's *Categories* but rather to the first three chapters of the *De Interpretatione*.

The second *Tractus* continues to treat of the subjects dealt with by Aristotle in the *De Interpretatione* except for a short section (roughly one fifth of the whole, pp. 232-249) at the end where he begins to treat of the categorical syllogism.

The third treatise contains Abelard's treatment of topics. He first sets down the views of Boethius which he accepts as his own, and then adds an account of the doctrine of Themistius and Cicero on topics. This leads to a discussion of the interrelation between the teaching of the three authors.

At the very beginning of this treatise Abelard gives the reason for treating topics in a work on logic.

Sicut ante categoricorum syllogismorum constitutionem ipsorum materiam in categoricis propositionibus oportuit praeparari, ita et ante hypotheticorum compositionem eorum propositiones hypotheticas . . . necesse est tractari (sic). Nullae autem idoneae propositiones in constitutiones syllogismi sumuntur nisi quibus auditor consentit, hoc est quas pro veris recipit . . . Quoniam ergo hypotheticas enuntiationes quarum sensus sub consecutionis conditione proponitu, inferentiae suae sedem ac veritatis evidentiam ex locis quem maxime tenent ante ipsas rursus hypotheticas propositiones *Topicorum* tractum ordinari convenit, ex quo maxime hypotheticarum propositionum veritas seu falsitas dinoscitur (*Dial.*, III, 253$^{4-18}$).

The reasons given for including the work of Themistius and Cicero is interesting:

Sunt autem alii (sc. loci) quibus dialectici raro ac numquam fere utantur, quos tamen Boethius Graeci Themistii atque Romani Tulii divisiones de locis plene executus non praetermisit. Hos quoque [tractabimus] ne quid doctrinae subtrahere videamur eaque etiam tractare pigrum non sit quae de divisionibus eorumdem auctorum restare atque nostro deesse tractatui videntur (*Dial.*, III, 413$^{29-34}$). Cited in the Introduction, p. xxviii.

It is in explaining the relation of the views of Themistius and Cicero to those of Boethius that Abelard sets forth his own.

The very fact that he includes such an extensive treatment of topics, as well as the reasons he gives for doing so, proves that Abelard cannot be enlisted on the side of those who would exclude material logic from logic.

The fourth treatise is concerned with hypothetical propositions and with the hypothetical syllogism that can be formed from such propositions. It opens with a strong statement of the legitimacy of logic, and of its usefulness for theology. It is too long to quote, but it would help to show why Abelard had both firm friends and bitter enemies.

This fourth treatise "gives a paraphrase of Boethius' work *De Syllogismus Hypotheticus*" (p. xxx).

The final treatise of the work is on division and definition, and is also "a paraphrase of (the work) of Boethius of the same name" (p. xxx).

We are reminded, however, in a footnote (n. 1, p. xxxi) that the work printed by Migne under the title *De Divisionibus et Definitionibus* and *assigned* to Boethius by Migne is, as a matter of "established fact" . . . written by Marius Victorinus.

The part of the Introduction that follows the analysis of the contents of Abelard's work is an effort to analyze some of the logical notions of the work and to show their relation to present day studies of the same or allied topics. It parallels similar studies done for ancient logic by men like Bochenski and Mates. This development really amounts to a long study of Abelard's whole work as seen through the perspective of modern logic, since it draws not only on the *Dialectica* but on all the known works of Abelard, especially *Logica Ingredientibus*. This thoroughness gives the work done real value, even though the choice of the point of view necesarily neglects large areas of Abelard's work. This criticism would hold for anything less than a full scale book and it is said here not in reproach but rather in regret.

Of considerable interest, to this reviewer at least, is section 6 where De Ryk goes into Abelard's changing interpretation of the function of the copula. He is said to have held the inherence theory in his early work, and to have come, in the *Dialectica*, to an identity theory. It is not perfectly clear on first reading at least, that Abelard's words mean that his identity theory "takes the function of the copula to be the identification of the extensions of the subject term and the predicate term" (p. xl).

The final section (section 16) of the Introduction is concerned with Abelard's position in 12th century logic. As De Ryk remarks, his position "cannot be exactly determined before the writings of his contemporaries are available" (p. lxxxix). In fact the publication of the work under consideration has, aside from its intrinsic importance, as one of its principal advantages the fact that it will stimulate the publication of related works and so make it possible to write a more authentic chapter of one period in the history of logic.

De Ryk's considerations are grouped under two headings: (1) Abelard's "appreciation of dialectic, especially its relation to the faith," and (2) "What was the choice he made between nominalism and realism?"

It would be a lack of gratitude on the part of those interested in the history of logic not to congratulate all concerned, De Ryk, the publisher, and the Netherlands Office for Pure Research, which gave a grant toward publication, for their part in making available this fundamental work.

Although the work is well printed, it may not be amiss to point out at least one lapse, to be found on p. xxv of the Introduction, where a line seems to have been omitted after the first line of paragraph 2 of section 4.

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Semantics and Necessary Truth, An Inquiry into the Foundations of Analytic Philosophy. **By Arthur Pap. New Haven: Yale University Press, 1958. Pp. viii + 456, with index. $6.75.**

Contemporary analytic philosophy, especially its logical empiricist branch, has held a hard and fast distinction between the *a priori* and the empirical elements in knowledge. The classes of *a priori* and empirical statements have been looked upon as mutually exclusive and, in conformity with his positive program of establishing the foundations of science and his negative program of dismissing metaphysics, the analytic philosopher has usually argued that the mutually exclusive polar classes of *a priori* and empirical statements together exhaust the entire system of cognitively meaningful statements. By this rule of classification synthetic *a priori* statements do not exist. In recent years prominent analytic philosophers, e. g. M. White and W. Quine, have challenged the absoluteness and the fixity of the distinction, proposing in its place a gradualist thesis that takes account of pragmatic considerations. In line with this rising inclination to loosen the old classifications Pap's *Semantics and Necessary Truth* is the first full-length book devoted wholly to the exploration of the problem.

Pap's *Semantics and Necessary Truth* is unusual in the literature of contemporary analytic philosophy because it opens with historically as well as logically oriented discussions of the doctrines of necessary truth held by Leibniz, Kant, Locke and Hume. But I doubt whether historians will be consoled by Pap's treatment since his motive is not so much to show the insights of the historically great as it is to stress how prominent analytic philosophers are guilty of the same old errors and confusions. What I think is positively gained from Pap's discussion, however, is a recognition that the textbookish empiricist-rationalist dichotomy of the modern philosophers leading up to the critical philosophy of Kant proves erroneous upon a close examination of their writing on a special central issue.

After this historical excursus in the first four chapters, Pap examines in the remaining ten chapters the theories of C. I. Lewis, Russell, Moore, Wittgenstein, Carnap, Quine, etc. Pap assumes that his reader already has had a technical acquaintance with the subject matter, though he has added a glossary of terms for the uninitiated who might dare read on. The bulk of the book consists of very close commentary and criticism. Immediately it is evident how much basic disagreement thrives in contemporary analytic philosophy which to the spectator may appear both monolithic and menacing. Since Pap sticks closely to criticism, his book is in that dispassionate polemical vein destined to draw fire and excite controversy, though this procedure often conceals his constructive suggestions.

Pap openly disavows nominalism, and for good reasons. Intensions are not uniformly reducible to extensional languages whose variables range only over individuals (pp. 51-53). Belief statements are not subject to truth functional analysis of extensional logic (pp. 173 ff.). Pap therefore acknowledges that propositions exist (pp. 185-201). Although he conceives a proposition as a non-temporal objective constituent of a cognitive situation in which the subjective constituent is a knower, he nevertheless cuts short his ontological commitment by refusing to admit that it is Platonist or metaphysical, despite the fact that propositions operate like Platonic universals since they participate in many temporally and spatially different cognitive contexts and indeed may be, even without participating in any. Pap's allergy to metaphysics is evident in his verbal equations of it with mysticism (pp. 90, 188, 201). Consequently, the metaphysics embedded in his thought remains cryptic and undeveloped.

Pap's major contructive suggestions pertain first to his treatment of necessary truth and secondly to his view of analytic philosophy. In effect, Pap maintains that "What marks a proposition as a priori is not that it is capable of being known, either as true or as false, with *absolute certainty*. It is rather that the only kind of cognitive activity which we admit as appropriate to its validation is conceptual analysis and deduction" (p. 126). Accordingly, not only are logical laws and postulates upon which deductions depend as well as the deductions themselves *a priori*, but also synthetic propositions like "every color is extended" are *a priori*. Neither the logical laws nor the synthetic *a priori* propositions can be found to be true *a priori* by explication of meanings alone. For the basic principles of logic elude purely linguistic (pp. 170 ff.) or semantical treatments (pp. 411 ff.), as do synthetic

a priori propositions involving simple concepts which, by virtue of their simplicity, cannot entail each other (pp. 224 ff.).

While the *a priori* breaks up from above into analytic and synthetic, with basic questions still remaining concerning, for example, the nature of logical constants, it also undergoes revision from below. Considerations of the empirical sciences show that the *a priori* is built up from the empirical in certain contexts, while in other contexts it is discovered that the term "necessary" has expressive rather than cognitive significance (pp. 361 ff.). Of course, Pap does not deny the existence of necessary truth in still other contexts. Indeed, he so insists on the absoluteness of such truth that he rejects both the ordinary language philosopher who would make it contingent on actual linguistic usages and the formal semanticist Carnap who maintains that logical truth is always relative to a language system, the choice of such system being arbitrary. The salutary effect of Pap's incisive criticisms and reasoned repudiations of these theories cannot be minimized.

How, then, is *a priori* truth to be known? Here Pap's answer reveals unquestionable affinity to rationalist and Kantian modes of thinking. For Pap seems to argue that the absolute modalities of the logical laws and the synthetic *a priori* are known by intuition (pp. 419-422). Many objections have been raised against the employment of intuition as the spring of countless "metaphysical" theories, but Pap dismisses them because intuition, used properly by scientific minded inquirers, must perforce agree in its results and so avoid "mysticism." What Pap proposes, perhaps unintentionally, is nothing less than a counter-revolution against empiricism which has allied itself with logic to undo speculative philosophy, a counter-revolution which, if successful, will re-instate rationalism.

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Socialism and Saint-Simon. **By Emile Durkheim. Yellow Springs, Ohio: The Antioch Press, 1958. Pp. xxix + 240. $5.00.**

The Doctrine of Saint-Simon. **Translated by Georg G. Iggers. Boston: Beacon Press, 1958. Pp. xlvii + 276, with index. $4.95.**

Both of these volumes are commendable efforts to fill lacunae in the materials available in English on Saint-Simon and his followers. Durk-

heim's book, originally presented as a course of lectures at the Faculté des Lettres at Bordeaux, in 1895-96, is the completed portion of his projected history of socialism which, due to the press of other work, he never found time to finish. The translation, by Charlotte Sattler, is based upon the French edition, *Le Socialisme*, originally edited by Marcel Mauss, Durkheim's student and collaborator, and substantially completes the translation of Durkheim's major works into English. As with Durkheim's study, *The Doctrine of Saint-Simon* was also presented originally as a course of lectures. Iggers' translation, however, includes only the first of the two-year lecture series begun by Saint-Simon's disciple, Saint-Amand Bazard, in a hall on the Rue Taranne in Paris in December, 1828. The translation itself is based upon the third, "revised and enlarged" edition of the *Doctrine de Saint-Simon, Exposition; Première Annee*, 1828-1829, published in Paris in 1831.

Durkheim's study of socialism is pre-eminently an application of sociological and historical method to the analysis of the causes of the ideology of socialism. He begins his analysis with the formulation of a definition of socialism: "One calls socialist those theories which demand a more or less complete connection of all economic functions or of certain of them, though diffused, with the directing and knowing organs of society" (p. 21); after which, he carefully distinguishes between socialism and the pre-Soviet varieties of communism, the eighteenth-century theories and views which precoursed socialism and the social and economic developments which precipitated its formulation.

The final two-thirds of *Le Socialisme* is devoted to Saint-Simon; hence the English title. Durkheim treats Saint-Simon's thought not only as economic theory, but more pertinently as a system of moral philosophy intended to solve the social problems of the new industrial age. In this connection, it is worthy to note that Durkheim, unlike many commentators, considers the ideas of Saint-Simon to have been basically systematic. Although he admits that Saint-Simon failed to develop many of his ideas and enunciated a multitude of principles and plans for reform whose consequences and method of application were left to his followers to explicate, nonetheless, Durkheim on the whole succeeds rather well in his attempts to demonstrate the fundamental unity of the Saint-Simonian proposals for the reconstruction of the temporal order. This Durkheim accomplishes without overlooking the elements of rationalism, technocracy, anarchism, internationalism and pantheism implicit in the teachings of Saint-Simon.

Durkheim's concern with the moral implications of Saint-Simon's

teachings leads him to his major criticism of Saint-Simonianism, namely: that Saint-Simon's wish to establish a stable society upon a purely economic foundation leads to unrestrained materialism because of his failure to postulate an appeasing or moderating force external to the economic order. Although in his final work, *Nouveau Christianisme*, Saint-Simon accentuated the religious implications of his system, Durkheim points out that the only effect such an extension can have is to apotheosize comfort and sanctify excess under the banner of a materialist pantheism. In short, "what caused the failure of Saint-Simonianism is that Saint-Simon and his disciples wanted to get the most from the least, the superior from the inferior, moral rule from economic matter. This is impossible. The problem must be put this way: to discover through science the moral restraint which can regulate economic life, and by this regulation control selfishness and thus gratify needs" (p. 240).

Durkheim's analysis of the sociology and philosophy of Saint-Simon brings him to the conclusion that Saint-Simon, rather than Comte, should properly be considered the founder of both positivist philosophy and sociology. Durkheim's view is consequently incompatible with that of those who have banished Saint-Simon to the camp of the utopian socialist. In the course of arriving at this conclusion, Durkheim provides the reader with an understanding of his own intellectual relationship to Comte and Saint-Simon, one which appears to make of Durkheim something less than the popular conception that he is a full-fledged disciple of Comte. In the introduction, the editor, Alvin W. Gouldner, also develops this theme—the major convergences and divergences between Durkheim's thought and that of Comte and Saint-Simon—and concludes that Durkheim can perhaps be best described as "an uneasy Comteian."

In short, the reader finds in this volume a skillful analysis by a first-rate *fin de siècle* social scientist of the historical and sociological origins of socialism, conceived as an ideology, in the pre-Marxian period, with especial emphasis upon the theories of Saint-Simon and his school.

The purpose of *The Doctrine of Saint-Simon*, according to Durkheim, was to present "a synoptic representation of the principal theories in cogent form" of Saint-Simon. Iggers, a historian at Dillard University, whose editing of *The Doctrine* constitutes his first major published work, less reverently characterizes *The Doctrine* as a "pious fraud." In any event, Bazard, who, assisted by Barthélemy Enfantin, was responsible for the presentation of the lectures, did more than merely coordinate

the diffuse writings of Saint-Simon. Under his auspices, Saint-Simon's theories were developed and elucidated considerably, a prime example being the formulation of devices involving changes in the rights of ownership whereby social order was to be reconstituted. Whether or not Bazard actually made additions to the principles of Saint-Simon is problematical. What appears clear is that *The Doctrine* is less empirical and more idealistic than are the writings of Saint-Simon himself. The doctrine of ineluctible progress is emphasized, religion and science are synthesized and the rationalist and scientific elements of Comteianism sharply distinguished. Particularly apparent is the emergence of a theory of the state which foreshadowed the rise of totalitarianism. This development is a result of Bazard's view of mankind as an organism, whose societal evolution constitutes a series of increasingly perfect "organic epochs," which are interspersed with antithetical critical periods. The former are those ages in which harmony and order reign supreme with the ultimate goal, as Iggers points out in his introduction, "the total organization and rationalization of all human behavior within the framework of a hierarchy of the able." The realization of this objective was to be secured without recourse to violence; rather, reliance was placed upon a gradual process of education premised and sustained by the concept of brotherly love. Ideas, rather than social and economic motivations, were consequently viewed as the basic forces in history.

The translation of *The Doctrine* itself, while retaining the oratorical qualities of the original, is spritely and contains many a well-turned phrase. Iggers' introduction specifies the intellectual currents which influenced the disciples of Saint-Simon, delineates the history of the Saint-Simon school and summarizes the major teachings and implications of *The Doctrine*, especially its totalitarian aspects. In addition to occasional footnotes of his own, Iggers has also included a number of those provided by C. Bouglé and Elie Halévy in their edition published in Paris in 1924. These notes aid considerably in elucidating some of the more rhetorical passages of the text, as well as being of particular moment to the reader interested in the history of ideas. By way of criticism, one wishes that Iggers had included in his volume the *Second Year* of *The Doctrine* which continues the emphasis of the latter lectures of the *First Year* upon politics and religion and which paralleled the establishment of the Saint-Simonian "Church."

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An Interpretation of Whitehead's Metaphysics. **By William A. Christian. New Haven: Yale University Press, 1959. Pp. xii + 419, with index. $6.00.**

Depending much upon the type of universe you are prepared to acknowledge, Whitehead may be of great value. If you recognize a processive world, with historical reflectiveness, a multiplicity of value structure, a growth of organic consciousness, a growing realization of the personal/communal tension, and an acceptance of the proliferation of the sciences, then Whitehead had much to offer. Yet what he offers, far from being clothed in the traditional garb of conventional definitions, is a confrontation with experience rooted in a processive world. His aim is systematic unity.

The author, concerned with the difficulty yet also the importance of the later writings, is attempting to meet the need for "something more advanced than the introductions and more comprehensive than the special studies" (p. 4) of Whitehead's metaphysics. To this end he proposes to examine three positions of Whitehead: a) the theory of actual occasions, b) the theory of eternal objects, and c) the relationship of God and the world. One can readily discern the author's ability at presenting, in each of these, Whitehead's position in relation to the world: he never superimposes himself upon the world by having a ready-made structure that will cut the world into more easily handled sections; always we are aware that Whitehead is attempting to so adjust his own vision that it will be adequate to the objects.

The theory of actual occasions is the result of Whitehead's facing up to the world and asking "What is it?" For him actual occasions possess internal unity and concreteness as well as novelty; each actual occasion also possesses mutual exclusiveness. A reply to the question of the success of Whitehead's pluralism is given in two chapters which discuss the theory of extension and his notion of substance. It is this latter chapter that deserves our attention. In spite of those who claim that substance is rejected (showing us sentences that seem to support this) there is clear evidence that what is rejected is aspects of the conception of substance held by Descartes and Kant. What is accepted about substance is its permanence, its self-existence, and its individuality. Whitehead does not opt for process over substance, but tries to retain both. (Clearly the path is open for a comparison between the more traditional views of substance and this view that seems to be working back to that tradition, albeit from a different level of com-

prehension.) Therefore, every actual occasion is seen as both individual and transcendent, as well as organically related to all other real things. This is referred to as the doctrine of social immanence and involves us with a concern for knowledge and influence between entities.

The theory of eternal objects is Whitehead's attempt to handle the problem of actuality and possibility. He reduces neither, nor refers to one as reality and the other as less; rather, he finds his solution, as the author sees it, through the notion of possibility. The explication of eternal objects involves detailed concern with the notion of universals, relations, and creativity.

The third position that is examined is the relation of God to actual occasions. The reader schooled in the more traditional manner of expression can readily see here the problem of immanence and transcendence; yet we must guard against this reduction. While Whitehead does use the tradition—no philosopher can operate without a tradition—his way of posing questions is an attempt to exclude many of the difficulties that inhere within the traditional structure of posing certain questions. Rooting his concern for God in the arbitrary introduction of God by Descartes and Leibniz, Whitehead attempts "to treat the concept of God as the chief exemplification of the categories of his system" (p. 287). This concern for God is placed within the situation of a relationship of God and a world both in process; whereas, the traditional is concerned with the process of the world coming-to-be and its relationship to God. Whitehead wants to preserve the actual situation of the relationship of God and the world; the traditional way of philosophizing seems to show more concern with attempting to elaborate what the relationship of God and the world *could be* in terms of the nature of both. This section on God and the world contains chapters on 'God and the Categories,' 'How God affects the World,' 'How the World affects God,' 'Transcendence and Immanence,' and 'Whitehead and Traditional Philosophy.'

While the author offers no over-all criticism, there are, at times, hints as to how the author believes Whitehead should be criticized. Since there is unquestionably an internal consistency in Whitehead, it may be that we are not now in a position to critically examine his entire philosophy from the perspective of its relationship to reality. Certainly there can be no valid criticism by way of showing his divergence from any popularly accepted system, for the ultimate criterion is not one system against another, but each system must be measured on the way

it measures up to reality. Attention may be called to the fact that Whitehead has no conception of being, at least not overtly. Even existence for Whitehead is not an ultimate category, it must be explicated. While these may disturb many, we must keep in mind what the author says about Whitehead's handling of old problems, "he forces us to think whether in the past we have put our problems in the right way" (p. 9).

Perhaps the most important fact pervading this book is that Whitehead steps beyond the philosophical ideal of *clarity*, that idea that has dominated philosophical thinking since the seventeenth century and coincides with the blossoming of modern science. For it is only through a philosophy that gives a rightful place to the mysterious that we can regain a vital contact with the world and Christian tradition. This is a fine book; it selects its problems and exposes them clearly and it continually refers to the words of Whitehead.

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Ethics. **By Charles A. Baylis. New York: Henry Holt and Company, 1958. Pp. x + 373, with index. $4.00.**

This book presents a detailed study of the foundations of the science of human actions and is the result of long reflection by a man who is very familiar with the controversy between the ethics of duty and axiology during the past decades. Even though its order has been determined in large part by historical factors, there is a logic in the presentation, which can be discovered by the reader as he formulates questions in anticipation to their treatment by the author. The first problem, determinism vs. indeterminism with respect to free choice, has the additional value of arousing the interest of the student just beginning ethics.

From the structure of the book it is evident that the book is meant to be a text. Herein lie many of its good points. While Baylis does not hesitate to put down his own convictions, still he does this in a way that is calculated to provoke critical thought on the part of the student. This is done by illustrating his own view and that of others by examples, some of which have little pertinence to moral conduct. Each chapter is followed by a well worked out set of questions and

topics for discussion, all phrased so that the student is led to form convictions of his own. The value of the book lies in its insistence on rational argument though one may well question the adequacy of a goodly number of the author's contentions.

A healthy current of realism does seem to pervade the approach. After discussing the pros and cons of determinism and indeterminism he adopts the position that man does have freedom of choice. Only then can one take up the search for a consistent set of principles which can guide wise choice. Conflicting views are proposed and criticized. In the recent past with the advent of linguistic analysis it has been fashionable to maintain that the traditional ethical problems are insoluble because statements about values or about the right course of action are neither true nor false. The emotive theories have done away with the prescriptive or normative character of ethical statements. If one is going to have any grounding in reality for his ethical theory, the skeptical and nihilistic views must be refuted. This Baylis attempts to do in the most effective way possible, namely, by attempting to show that we do have knowledge of the good and the bad, the right and the wrong. Whether Baylis achieves the desired realism may be surmised from the following statements. "What needs to be done . . . is to show that ethical utterances in which normative force is explicitly retained are amenable to empirical investigation and can in many cases be conformed or disconformed at least to some degree. If this can be done we shall have grounds for accepting some normative ethical statements *as probably true and rejecting others as probably false*" (p. 226). (Italics mine.) This task is to be accomplished "by enlightened application of the utilitarian criterion alone, by deciding in the light of the total evidence available, which is most likely to produce the greatest good" (p. 252). Of course, such procedures presume that we can come to a knowledge of values. Through many circuitous routes Baylis tries to establish that pleasant experiences alone are intrinsically good while neither knowledge nor virtue nor beauty is intrinsically good. He makes no claim for anything more than probable knowledge. What is probably true is also possibly false. Here we do not stand on very firm ground.

Weaving in and out of the maze of criticism Baylis develops his own ethical theory. Rejecting formalistic theories both of the pure and the mixed varieties he adopts a form of ideal utilitarianism. An act is right if it probably has a better result than any possible alternative would have. Its value is ultimately derived from its intrinsic, good,

conferring property, namely, pleasantness. In such judgments one must use long range views of happiness. Thus, Baylis espouses hedonistic utilitarianism. Indeed it seems that such a theory would be difficult to apply, and even for the most intelligent, living according to such theory would be as tedious as the study of this book.

Baylis calls his study a meta-ethics, and rightly so, for certain philosophical problems must be solved before one can hope to develop a science of human conduct. The solution of such problems while solidly grounded on proper evidence will involve knowledge that transcends the empirical. Perhaps a metaphysics would help one discover the nature of the good and help one see the need for a distinction between the ontological and the moral good. It would help one discover the nature of free choice and help one see that though the act of free choice itself is determined still it is not predetermined in its causes. Baylis' failure to see this makes him deny free choice even while admitting it. What he really attributes to man is freedom from external constraint or freedom of spontaneity rather than freedom of choice. This becomes exceedingly clear later in the book when he denies the possibility of merit for virtuous acts or retributive punishment for evil deeds. To say that I choose what I want does not mean that I have determined myself but rather that many antecedent factors have influenced me in such wise that here and now I want this. In this frame of reference Marxism could be defended as well as the author defends democracy in the last chapter if only one could manipulate social and economic factors to bring about the desired conditioning.

In a short review one cannot treat the many contentions that could well be challenged. Many issues call for further clarification. For instance, the author has hardly given a fair consideration to conscience. It is only his restricted view of conscience that prompts him to reject it as he does. However, it is the opinion of the reviewer that Baylis' thirst for evidence is really Aristotelian in spirit. His investigations will not end with the publication of this book.

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Whitehead's Metaphysics, An Introductory Exposition. **By Ivor Leclerc. New York: Macmillan, 1958. Pp. xiv + 234, with index.**

Whitehead's work is held in respect and often even referred to with awe. Yet in some ways it has been curiously unavailable to contemporary philosophical thought. In fact, many of his works are only now getting back into print. It cannot be that his thought is not relevant to our problems. It might even be claimed that he has a foot in both of the camps into which contemporary philosophy is divided; he is in some respects both analytical and existentialist. For this reason, of course, both sides may feel he is somehow 'unreliable,' or give greater value to either the earlier scientific or the later metaphysical writings. Further, while there is no denying that *Process and Reality* is his most ambitious philosophical work, there is disagreement even among his followers over what it is attempting and how best to understand it (a disagreement reflecting in some ways the dispute among neo-scholastics regarding the relation of philosophy of nature and metaphysics).

Lawrence—whose work on *Whitehead's Philosophical Development* was reviewed here (Vol. XXXII [1958] 412)—holds that the key to *Process and Reality* is to be found in the earlier works on the philosophy of science and comes as its culmination. Leclerc, on the other hand, maintains that, although Whitehead's personal development may follow such a course, the last period carries him onto a different level, where in fact he is closer to the objects of traditional metaphysical concern than to his previous work. In effect, he claims that Aristotle's *Metaphysics* is more relevant to an understanding of *Process and Reality* than Whitehead's own earlier work on science. He accordingly attempts to provide an introduction to Whitehead's metaphysics that begins with Aristotle's formulation of the metaphysical problem (where he leans heavily on the work of Fr. Owens). The result is that Whitehead appears much more of an Aristotelian than ever before. This is a genuine achievement in that the relevance of Whitehead's thought to traditional metaphysics is thoroughly manifested, and is made available as never before to those who would approach him through the ancient philosophical tradition.

A great part of Whitehead's difficulty is his terminology. It is bad, sometimes almost atrociously so, on any theory of what Pierce called the "ethics of terminology." He mixes words of ordinary language, such as "feeling," "satisfaction," "decision," "event" with such terms

of his own invention as "concrescence," "ingression," "prehension," "superject." Applied to matters of great difficulty, they often result in nothing but mystification. By his method Leclerc is able to dissipate much of this and achieve a great clarification.

Yet this clarification, great and useful as it is, is not obtained without some loss. Isolating Whitehead's metaphysical concerns eliminates the scientific context in which they arose for him, and with that the value and excitement of finding metaphysical problems involved in the work of science. What is perhaps more serious, it results in dropping from consideration one of the five parts of *Process and Reality*, i. e. the theory of extension, to which part IV is devoted.

Whitehead's greatest works, in size, scope, and profundity, stand at the extremes of his productive life: at the beginning the *Universal Algebra* and *Principia Mathematica* (in collaboration with Russell), and *Process and Reality* at the end. Until the very end of his life he continued to look upon mathematical logic as his "first love," and considered that, up to 1937, it had achieved only a "minute fragment of its possibilities." In many ways the most pertinent question for Whitehead's thought, and also for much of contemporary thought, is the relation of the metaphysics to the logic. Whitehead, like Russell, came to philosophy from his great work in logic. Russell in his philosophical atomism consciously seeks a metaphysics that is in accord with that logic. It is hard not to believe that Whitehead, in his way, is up to the same thing. Leclerc by his approach excludes consideration of any such question. Yet to ask for it is perhaps unfair, since it is to demand of him another book than the useful one that he has written.

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A Guide to the City of God. **By Marthinus Versfeld. London and New York: Sheed and Ward, 1958. Pp. xii + 141, with index. 10/6 net.**

The fall of Rome in 410 found most Christians unprepared, doctrinally and psychologically, for this incredible catastrophe. Augustine of Hippo met the challenge by producing the most important of all his writings—*The City of God.* Though occasioned by apologetical considerations, which occupy the first part, the work lays the foundations for a whole

Christian interpretation of history. There are interesting parallels between our own contemporary crisis and that of Rome in the early fifth century; not least of these is the wide appeal of St. Augustine's *City of God.*

Marthinus Versfeld, who has been guiding students through the dense erudition of this Augustinian masterpiece for many years, now presents the fruits of his rich experience in this handy volume which excels as a model of clear, penetrating, and stimulating exposition. To the earlier introductory studies of Barrow and Burleigh, the present work is a worthy companion and complement. Notable, however, is the omission of any reference to the latest English translation of the *City of God* or to its masterful Introduction of nearly one hundred pages from the pen of Etienne Gilson, published in *The Fathers of the Church.*

Except for chapter one, which contains a suggestive comparison of the Platonic and Augustinian views of history, the remaining chapters are devoted to a simple, direct exposition of the underlying themes of the last twelve books. There is probably merit in Versfeld's recommendation that, for a first reading of the *City of God,* the first ten books might be omitted.

Close students of Augustine's intellectual development will take objection to the Author's assertion that the saint ". . . abandoned Manicheism for Platonism" (p. 2), which takes no account of the intervening skeptical period, regarded by Augustine himself as the most critical time in his life. Besides, Augustinian specialists are divided on the question as to whether the Platonic influence preceded or followed or coincided with Augustine's return to the Catholic faith. But Professor Versfeld has written for beginners, and these will find him a competent and interesting guide.

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The Philosophy of Plotinus. **By Emile Bréhier. Translated by Joseph Thomas. Chicago: The University of Chicago Press, 1958. Pp. vii + 205. $4.50.**

Good news indeed for scholars of Greek philosophy and for everyone interested in the philosophy of Plotinus. The English translation of the important work of the great French historian of philosophy was

long overdue and the Rev. Joseph Thomas, associate minister of the First Methodist Church in Evanston, Illinois, has rendered a great service in filling up this lacuna.

La Philosophie de Plotin is such a piece of scholarship and so well known to professors of philosophy, that the present reviewer does not think it necessary to insist upon the qualities of this work, which gives an accurate explanation of Plotinus' "divine things."

It is very fortunate that the translator may have obtained from Bréhier himself an interpretation of "The Sensible World and Matter" which was lacking in the French edition. We thus have a more complete synthesis of the whole of Plotinus' philosophy in a short book. One has only to glance at the table of contents to be assured on this point. Starting with a chapter on "The Third Century of our Era," Bréhier then explains the "Enneads," "The Fundamental Problem in the Philosophy of Plotinus," "The Procession," "The Soul," "The Intelligence," "The Orientalism of Plotinus," "The One" and "The Sensible World and Matter."

Although the material of the original study is now more than thirty years old, even if a new edition appeared in 1949, no other book gives a more concise and precise insight into the philosophy of Plotinus and the author has added a few references to more modern researches. The author's bibliographical note (pp. 198-202), giving information on the various editions of Plotinus, on the general work, on detailed studies, on the influence of Plotinus, on the English translations of the *Enneads* and on the English books on Plotinus will prove most valuable. We think however that such important works as the following would give further usefulness to the bibliography: Maurice de Gandillac, *La sagesse de Plotin* (Paris, 1953); Jean Trouillard, *La procession plotinienne* (Paris, 1955), and *La purificatione plotinienne* (Paris, 1955).

Rev. Joseph Thomas, former student of Bréhier's at the University of Paris, was well prepared to give us this version. No doubt this association with Bréhier was of great help to him.

The translation written in a very good style and rendering the French text in clear and precise language is in itself a work of scholarship. This is no small merit, if one considers that translations, too often, give only an approximate or distorted idea of the original.

The excellence of the version, the new chapter which Rev. Thomas obtained from Bréhier, the author's bibliographical note and the indices, make this short introduction an indispensable instrument for professors and students alike.

The translator deserves very sincere congratulations and his work should be placed on every college's library shelves.

GASTON CARRIÈRE, O. M. I.

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A Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful. **By Edmund Burke. Edited with an introduction and notes by J. T. Boulton. London: Routledge and Kegan Paul; New York: Columbia Universtity Press, 1958. Pp. cxxx + 197, with index. $5.00.**

The Correspondence of Edmund Burke. **Volume I. Edited by Thomas W. Copeland. Cambridge: University Press; Chicago: University Press, 1958. Pp. xxvi + 375, with index. $8.00.**

Burke's *Philosophical Enquiry* was not his first published work; *Vindication of Natural Society* had appeared the previous year in 1756. Yet the *Enquiry* was in fact the first complete work to come from Burke's pen. His interest in its subject had been aroused while he was a student in Trinity College and he had probably begun work on the first draft of it as early as 1747, ten years before its publication. The *Enquiry* thus represents Burke's earliest sustained intellectual preoccupation. It does not contribute much, as some have believed, to an understanding of his later political thought. But as a contribution to esthetic theory it was not without influence in its day and later, and it remains of interest both to the student of English literature and to the biographer of Burke.

It might as well be said at once that the *Enquiry* is not of high intrinisic value or importance. As Boulton points out in his introduction, Burke was a typical eighteenth-century man in that he looked for, and found, the immutable laws governing esthetic taste, as Newton had discovered the unchanging laws which governed the physical universe. Less typically, Burke rejected associationism as the psychological theory which should explain esthetic experience and based his own explanation squarely on sensationism.

Locke's sensationist psychology is assumed throughout the work. In an essay, "On Taste," which he prefixed to the second edition of the work, Burke says that "the senses are the great originals of all our ideas,

and consequently of all our pleasures." In the *Enquiry* itself, a rather crudely mechanistic theory of esthetic experience is presented. By beauty, Burke says, he means "that quality, or those qualities in bodies, by which they cause love, or some passion similar to it." He confines this definition to "the merely sensible qualities of things," in order to consider in isolation "the direct force which they have merely on being viewed." "Beauty," he concludes, "is for the greater part, some quality in bodies acting mechanically upon the human mind by the intervention of the senses."

In accordance with this sensationist theory, Burke rejects the proposition that physical beauty consists in certain proportions of parts. "Proportion," he says, "relates almost wholly to convenience, as every idea of order seems to do; and it must therefore be considered as a creature of the understanding, rather than a primary cause acting on the senses and imagination." Beauty, however, "is no creature of our reason, since it strikes us without any reference to use, and even where no use at all can be discerned." This was unqualified sensationism, boldly and forcefully presented, but not especially convincing.

The most original feature of the *Enquiry* was the sharp distinction which Burke drew between the beautiful and the sublime. Beauty arouses love, which is a positive pleasure and has as its object "society," that is, women, or human beings in general, or the animate world. But the sublime arouses delight, which results from the idea of "self-preservation." The experience of the sublime is therefore always associated with the dread of pain and danger. But the awe, fearful yet pleasurable, which dreadful objects inspire in us is, like our response to beauty, "antecedent to any reasoning," and a purely sensible experience.

Boulton's edition of this work is excellently printed and carefully annotated. The text is preceded by a lengthy introduction in which the work is thoroughly and competently criticized. Of perhaps even greater worth, however, is Boulton's attempt to trace the influence of the *Enquiry* on contemporary and later writers. Burke, he says, stood "alone in his uncompromising sensationism," and his "theory of beauty had almost as little influence on later philosophical writers as his sensationism." Yet he believes that Burke's theory of the sublime and of its radical distinction from the beautiful had a strong influence on esthetic thought until well into the nineteenth century. At the very least, Burke's *Enquiry*, for all its crudities and absurdities, was a bold

and original essay which stirred critical waters that had tended to stagnate.

Burke's correspondence during the years when he was working on the *Enquiry* and a decade afterwards is included in the volume edited by Copeland. The publication of what promises to be the definitive edition of all the extant letters of Edmund Burke has begun with this volume. It is an auspicious beginning. All letters written by Burke from the years 1744 to 1768 which could be found in any source, printed or manuscript, are printed here, with sufficient selections from letters received by him to make the correspondence intelligible. The printing is excellent and the editing even more so. Copeland has annotated the volume in a manner to make it a student's delight, and it is to be hoped that the same high standard will be maintained by his fellow editors throughout the seven or eight volumes yet to come.

The letters presented here are unevenly distributed in time. At the beginning of the volume there is a fairly heavy corrspondence from Burke's days as a student in Trinity College. Most of it may be found in Samuels, *The Early Life, Correspondence, and Writings of . . . Burke* (Cambridge University Press, 1923), and the portrait of the statesman as a young man which it delineates is already well known to scholars. At the other end is another heavy correspondence from Burke's first two-and-a-half years as a member of Parliament. In between a group of sixty-five letters spans a period of eighteen years, the most obscure in Burke's life. From this period we see him emerge, first to a literary, then to a political career. Much of the material here is newly published and what has been printed before was scattered through dozens of different sources. This volume of Burke's correspondence will therefore be invaluable to biographers of Burke and to students of British eighteenth-century history, literature, and political thought generally. All college and university libraries should consider it an essential purchase.

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Augustine, Philosopher of Freedom. **By Mary T. Clark, R. S. C. J. New York: Desclée Co., Inc., 1959. Pp. 273, with index. $4.50.**

'Why is the will of man free' is the question St. Augustine asked himself in his search into the mysteries of the dynamic relationship between God and man. It is proper to his approach to describe rather than demonstrate the act of free choice and so spend his time inquiring into the why and wherefore of freedom, integrating the whole question with his concern for human happiness. His solution, in brief, is that man is free for the good, free in order to love God and neighbor, thus to achieve full stature as a child of God.

This work is a comprehensive, balanced study of the thought of St. Augustine on freedom as seen against the background of some of his forerunners such as Plato, Aristotle and Plotinus, and weighed against later studies, of St. Anselm, St. Thomas and some twentieth century thinkers. The result is a well-written, clearly represented exposition of a pilot idea in the works of Augustine. It combines careful textual analysis with a critical study of the genesis of the doctrine of freedom in Augustine, its influence over the centuries and contemporary relevance in the world of thought.

It is not generally appreciated but a close study brings out that no philosopher of pre-Christian times really understood the significance of the will. Among the Fathers certainly a pioneer in working out a theory of free will and freedom is St. Augustine. As we follow the author through the *De Libero Arbitrio* and other early dialogues, as well as through the *Confessions*, it becomes clear that we are engaged in a dialogue on freedom of fulfillment, theological freedom; for we are discussing the freedom of existential man, who, like Augustine, knows in his own life the effects of original sin and the need he has of God's grace to achieve true freedom.

At this point one might ask with what right Augustine can be called a philosopher in this context? The answer is that in his attempt to understand freedom St. Augustine combined, without confusing, faith and reason. There is always genuine philosophical orientation in his thought, even when it is permeated with the wisdom of the Faith. Mother Clark, noting that "the special characteristic of the Augustinian doctrine is that it is integral," states that

> Because grace, far from destroying nature, builds upon it, there is embedded in Augustine's explanation of theological freedom a philosophy of freedom

that exposes the nature of the free human will, its purpose and its relation with other human faculties, as well as insight into the conditions for attaining the perfection of man. To set up such a philosophy separately would do violence to the Augustinian method. Nevertheless, the natural structure is there, a structure of spiritual freedom, virtually present within the doctrine of theological freedom that Augustine formally treats (p. 119).

How much was Augustine dependent on Plotinus for his theory of freedom? The texts seem to say that he was much less so than is generally supposed. Mother Clark's work points up the benefit a close knowledge of Plotinus is to the student of Augustine, if it does nothing else than bring home to him the independence from Plotinus his faith and mature thought brought Augustine in the working out of his own views. In brief, Plotinus makes freedom an intellectual self-determination; he gives man a divine freedom. Man is able to pull himself up by his own bootstraps to the level of true freedom.

The Thomist will be interested in how the author handles the manner in which St. Thomas uses the doctrine of St. Augustine in his own synthesis of Christian wisdom. Here, as in other areas, St. Thomas grounds the intuitive wisdom of Augustine on the bedrock of an existential metaphysics. "Unlike Plotinus and Aristotle, both St. Augustine and St. Thomas recognize the tremendous dignity and power of love" (p. 192). The author's statement that "the radical Augustinism, which is the actual teaching of St. Augustine himself, is never opposed to the teaching of St. Thomas" (p. 234), seems too facile. The reason given for the statement is that Augustine handled together such realities as reason and faith without confusing them.

A summary conclusion at the end of each chapter is helpful. The work is well documented; the bibliography is extensive and up-to-date, listing almost exclusively works in English, French and German. There are indices of proper names and of references to works of St. Augustine but no topical index. The foreword is by Vernon J. Bourke and the criticism of pertinent sections of the book by Jacques Maritain, James Collins, and Elizabeth Salmon is acknowledged. The influence of Fr. Paul Henry, S. J., is also noted.

The modest hope of the author for her book, that it serve as "a point of departure for a deeper penetration into the Augustinian doctrine of freedom through the combined explorations of philosophers and theologians" is one entirely deserving fulfillment. Mother Clark's scholarship and balanced judgment make one hope she will continue her own studies in Augustine.

Particularly well done and relevant to the world-situation is the chapter on twentieth-century views on freedom. Existentialists occupy the major section in this analysis, though others too like Bergson, Maritain and Blondel are covered. The point of contact is, of course, their common thirst for freedom. The worth of Augustine's demanding an answer to the why of human freedom is seen in the difficulty the atheist has in giving meaning to his freedom as well as the case of anyone with less than a complete philosophy of the human person when he essays a rounded theory of freedom. The young intellectual who set himself the goal of knowing God and the human soul provides our age with valuable insights into the mystery of human freedom under God.

Augustine's was a pioneering effort. His doctrine is pertinent to the world of today. In his teaching on freedom we find a trace of the "ever ancient, ever new" he himself discovered in the beauty of God's truth. For bringing his doctrine to the attention of today's thoughful reader, Mother Clark deserves our sincere thanks. Her book, *Augustine, Philosopher of Freedom* is a definite contribution to Augustiniana.

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